3.11 HYDROLOGY

Introduction

This section describes the hydrology and water quality conditions present within and around the SUMC Sites including surface and groundwater resources. This section evaluates whether the SUMC Project could affect storm drainage and streams, as well as local groundwater resources in the area. Potential impacts expanded upon in this EIR section are groundwater and surface water quality degradation during construction and operation, flooding and drainage, and loss of groundwater recharge. The potential for mudslide hazards is addressed in Section 3.10, Geology, Soils, and Seismicity, as landslides and liquefaction impacts.

Information presented in this section was obtained through a review of topographical maps of the area and reports prepared by the California Department of Water Resources, the U.S. Geologic Survey, the Regional Water Quality Control Board (RWQCB), and the City of Palo Alto. Related plans and policies are explained, including the City of Palo Alto Comprehensive Plan, the Santa Clara Valley Water District Groundwater Management Plan, the Santa Clara Valley Urban Runoff Pollution Prevention Program, and the Santa Clara Valley Urban Runoff Program Urban Runoff Management Plan. Potential hydrology and water quality impacts were determined by assessing the SUMC Project’s land use change impacts on drainage, groundwater conditions, and potential water quality concerns both during and following the construction period, based on specified impact significance criteria.

Issues identified in response letters to the NOP and during the Planning and Transportation Commission and City Council public scoping meetings for the SUMC Project were considered in preparing this analysis. Applicable issues that were identified mostly pertain to the potential for impacts on San Francisquito Creek, which runs 0.25 mile north of the Main SUMC Site. These issues, including effects of operation and vehicle trips on roadway erosion, are addressed in this section.

Existing Conditions

Surrounding Areas

Climate. Climate in the areas surrounding the SUMC Sites is a Mediterranean-type climate characterized by wet but relatively mild winters and dry summers with variable summer temperatures, depending on the region. Mean annual precipitation in the vicinity is about 15.7 inches per year with 89 percent occurring during October through March. Mean annual temperature is 59.2 degrees Fahrenheit (°F) with the minimum mean monthly temperature occurring during December (48.7 °F) and the maximum mean monthly temperature occurring during July and August (68.0 °F).

Ground Features. The topography, soils, subsurface materials, and geologic structure of the SUMC Sites and surrounding areas are addressed in Section 3.10, Geology, Soils, and Seismicity. The distribution and relationship of these features influence the location, form, and quality of surface water and groundwater. In turn, these features are shaped, to a greater or lesser extent, by standing and flowing water, whether on the ground surface or beneath it. Most soils in the urbanized portion of Palo Alto, for example, were eroded by flowing water from upland terrace slopes or bedrock ridges and deposited as river channel or pond sediments in the structural valley that forms San Francisco Bay (Bay).

Surface Water Drainage. Land development and modification of natural drainages have altered infiltration and runoff rates, changing the timing, distribution, and magnitude of surface water and groundwater flow. Urbanization has increased runoff by the development of impervious surfaces, surface soil compaction, grassland conversion, dewatering of upland stream valleys, and the degradation of natural riparian communities. Both the peak flow rate and volume of storm flows typically increase with intensified urbanization and the delivery of runoff to streams after the beginning of rainfall becomes flashier, thereby reducing the lag time between the rainfall and the peak of a stream’s flood stage. As development occurs in the Project’s vicinity, storm drainage systems are extended to convey stormwater to San Francisco Bay. Stormwater flows from urbanized areas of the City of Palo Alto are routed through street gutters and open channels to drop inlets connected to underground conduits beneath roadways.

Increased imperviousness can greatly alter runoff from small, frequent flood events by up to a 10-fold increase in flow rate. However, increased imperviousness often has little effect on flows during extreme events (e.g., 100-year flood flow events) because during these events, rainfall saturates even natural soils, rendering them effectively impervious.

Runoff from the area in which the SUMC Sites are located is collected in the local Stanford University storm drainage system or the City of Palo Alto storm drainage system, which both ultimately discharge to San Francisquito Creek (USGS HUC 18050003). (Section 3.15, Utilities, provides more information on the stormwater drainage system that serves the SUMC Sites.) San Francisquito Creek discharges to the San Francisco Bay South area. The creek is on the north side of Sand Hill Road, and at its closest point is about 0.25 miles north of the Main SUMC Site.

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4 USGS HUC refers to the US Geological Survey Hydrologic Unit Code.
San Francisquito Creek drains a watershed of about 42 square miles in the Santa Clara Valley Hydrologic Planning Area. The watershed encompasses the area from Skyline Boulevard at the top of the Santa Cruz Mountains to the San Francisco Bay, and includes lands in the cities of East Palo Alto, Menlo Park, Palo Alto, Portola Valley, and Woodside, unincorporated land areas of San Mateo and Santa Clara counties, and Stanford University.\(^5\) Historically, the sediment carried in high stream flows from the upland area was deposited as the stream flow slowed down in the flatter lowland areas, forming the San Francisquito Creek alluvial fan. Mean monthly stream flow (30-year average) measured in San Francisquito Creek at the USGS Gage 11164500 at Stanford University, upstream from the SUMC Sites, is listed in Table 3.11-1.\(^6\)

<table>
<thead>
<tr>
<th>Month</th>
<th>Flow (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>61.0</td>
</tr>
<tr>
<td>February</td>
<td>77.9</td>
</tr>
<tr>
<td>March</td>
<td>54.2</td>
</tr>
<tr>
<td>April</td>
<td>26.4</td>
</tr>
<tr>
<td>May</td>
<td>4.14</td>
</tr>
<tr>
<td>June</td>
<td>1.28</td>
</tr>
<tr>
<td>July</td>
<td>0.52</td>
</tr>
<tr>
<td>August</td>
<td>0.28</td>
</tr>
<tr>
<td>September</td>
<td>0.32</td>
</tr>
<tr>
<td>October</td>
<td>0.93</td>
</tr>
<tr>
<td>November</td>
<td>5.58</td>
</tr>
<tr>
<td>December</td>
<td>27.1</td>
</tr>
</tbody>
</table>


Peak streamflow for each year from 1977 through 2006 ranged from 82 cubic feet per second (cfs) in March of 1977 to 7,200 cfs in February of 1998.\(^7\)


Although San Francisquito Creek flows through an urban environment for most of its lower length, overall, about half of the total creek length remains in a near natural state.\textsuperscript{8} The reach of San Francisquito Creek near the SUMC Sites is an unaltered natural channel.\textsuperscript{9}

Stream flow in San Francisquito Creek is variable because of its dependence on rainfall.\textsuperscript{10} Most of the reaches in the lower watershed on the San Francisquito alluvial fan are dry about six months out of the year. San Francisquito Creek is generally a “losing stream.” In other words, flow through San Francisquito Creek infiltrates to groundwater. A USGS study measured that, overall, flow loss from San Francisquito Creek contributes about 951 acre-feet of groundwater recharge per year.\textsuperscript{11} The reach of the San Francisquito Creek to which the SUMC Sites discharge contributes about 322 acre-feet of groundwater recharge per year. During high flow conditions (where flow is more than 19 cfs at the San Mateo Drive bicycle bridge\textsuperscript{12}), about 14 percent of flow was lost from San Francisquito Creek between the San Mateo Drive bicycle bridge and Alma Street. During low flow conditions (less than 1 cfs at the bicycle bridge), all flow was lost; and, during moderate flow conditions (1 to 6 cfs at the bicycle bridge), 36 to 95 percent of its flow was lost. Furthermore, isotopic and other chemical data indicate that urban runoff from residential irrigation or other domestic uses of imported water constitutes most of the streamflow in San Francisquito Creek during low-flow conditions.\textsuperscript{13}

**Flood Hazards.** The San Francisquito Creek is the dividing line between two counties: San Mateo and Santa Clara. The Santa Clara Valley Water District (SCVWD) has jurisdiction over most of the major streams and flood control facilities throughout the Palo Alto area, and has initiated ongoing drainage-way improvements, including San Francisquito Creek. The SCVWD is responsible for flood protection in Santa Clara County. The SCVWD has prepared a Stream Maintenance Plan (SMP) to perform routine activities undertaken in streams and canals and on adjacent SCVWD property and

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\textsuperscript{12} The San Mateo Drive bicycle bridge is located in the City of Menlo Park, north of San Francisquito Creek. The bridge terminates just north of San Francisquito Creek, near Vineyard Road on the south side of the creek within the City of Palo Alto.

The SCVWD’s principal maintenance activities are: 1) sediment removal from creeks and associated facilities such as sediment basins, fish ladders, and stream gage stations, and from water supply canals; 2) vegetation management along and adjacent to creeks and canals; and 3) bank protection on creeks. The SCVWD reviews drainage plans and general designs of specific land development proposals near streams and flood control channels under their jurisdiction for their hydraulic adequacy and prepares and implements capital improvement programs, such as levee restorations and improvements in San Francisquito Creek.

The San Francisquito Creek Joint Powers Authority (JPA) also has jurisdiction over San Francisquito Creek through the JPA agreement signed in May 1999 by the SCVWD and City of Palo Alto, which is a binding document for compliance to the JPA-stated goals and policies. Therefore, SCVWD does not have sole management of the San Francisquito Creek. Although the JPA is not a regulatory agency, it is responsible for coordinating activities for the San Francisquito Creek watershed within the member agencies’ jurisdictions.

The City of Palo Alto and Stanford University are responsible for the maintenance of and improvements to the storm drainage system serving the SUMC Sites. The City and Stanford Utilities Division review development plans for their potential impacts on the municipal storm drain system.

The SCVWD’s Design Standards specify that creeks and flood control channels should be designed or improved to contain the 100-year flood. An event with a one percent chance of being equaled or exceeded in any given year. San Francisquito Creek in the vicinity of the SUMC Project is adequate to convey the 100-year flood, although downstream reaches of the creek do not meet this design standard. The City of Palo Alto Engineering Design Standards for storm drain facilities requires that all new facilities be designed to convey the 10-year storm flow. Existing storm drain facilities in the vicinity of the SUMC project are adequate to convey the 10-year storm. Creeks and flood control channels are designed to a higher standard than storm drains because they are regional drainage facilities that have the potential to inflict substantial property damage and personal injury or death over a widespread area, whereas storm drain overflows typically result in relatively minor localized flooding of streets and intersections.

Because of the watershed’s topography, flooding has long been associated with San Francisquito Creek. Rainfall occurs mainly during the winter. Portions of the watershed near the crest of the Santa Cruz Mountains receive 40 to 60 inches per year, while the central Santa Clara Valley receives

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14 The SCVWD’s jurisdiction on a stream begins at that point where 320 acres (0.5 square miles) of watershed drain to the stream, and continues downstream to San Francisco Bay or the limits of the Pajaro River in Santa Clara County.
15 An event with a one percent chance of being equaled or exceeded in any given year.
17 Catherine Palter, Associate Director, Land Use and Environmental Planning, Stanford University, electronic communication with PBS&J, March 13 2008.
an average between 13 and 14 inches. The steep slopes of the mountains swiftly convey the water in tributaries to the Bay plain where the waters historically spread out across a much larger floodplain. Most of this floodplain has been converted to urban and residential development and the creek channel itself has been modified in some areas to provide flood protection. Nonetheless, major flood incidents have occurred in the past, most recently in 1955, 1958, 1982, 1995, and 1998. After the floods of 1955 and 1958, interim flood protection measures were implemented on the creek in the reaches upstream and downstream of US 101. The creek flooded again in 1998, when streamflows exceeded the highest on record. The 1998 flood inundated areas of Menlo Park, Palo Alto, and East Palo Alto downstream of El Camino Real.

San Francisquito Creek is in the SCVWD Northwest Flood Control Zone and San Mateo County’s San Francisquito Creek Flood Control Zone. The upland portion of the watershed consists of low density residential development and bushy woodlands. The relatively flat valley floor has been extensively developed and is typical of most urban areas. The primary flood problem is downstream of El Camino Real, and therefore, downstream of the SUMC Sites. Upstream of El Camino Real, to the west of the SUMC Sites, the channel has adequate capacity to convey the 100-year flood event.

In an attempt to control flooding and bank erosion in portions of the lower channel, areas on both sides of the channel between the University Avenue Bridge and US 101 have been lined with sacked concrete and protected with berms or low floodwalls. Additionally, there are intermittent areas of sacked concrete as far upstream as the Waverley Street bicycle bridge. The reach between US 101 and the Bay has been widened and leveed. However, the reach into which the area discharges is an unlined, unmodified, natural channel.

The severity of flooding in San Francisquito Creek has increased because of sedimentation. Sedimentation occurs in the reach of the creek downstream of US 101 because of tidal action and deposition of sediment from upstream sources. Sediment that is transported from the headwaters of the creek is deposited when water slows down as the gradient of the stream changes in the flatter parts of the watershed. Once deposited, sediment occupies space in the channel that is no longer available to transport floodwaters. Sediment can interfere with local drainage outfalls by blocking pipes and

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19 A Flood Control Zone is an area within a Flood Control District to monitor and manage flooding and flood control activities.


culverts. Recent studies in the headwaters of San Francisquito Creek indicate that erosion rates, and therefore downstream sedimentation, are currently quite high.\textsuperscript{24}

The SUMC Sites are not in a FEMA-defined 100-year flood zone.\textsuperscript{25} However, the SUMC Sites are located in an area designated by FEMA as “Zone X”, which is defined as an area that can experience a 500-year flood, can experience a 100-year flood with less than one foot depth of ponding or drainage area of less than one square mile, or is protected by levees from the 100-year flood event. A FEMA Zone X is considered a moderate- to low-risk area.

There are three small reservoirs in the San Francisquito Creek watershed that were built for water conservation and storage purposes. The first reservoir is Searsville Reservoir on Corte Madera Creek. The other two reservoirs are Felt Reservoir and Lagunita Reservoir, which are off-stream reservoirs fed by diversions from Los Trancos Creek and San Francisquito Creek, respectively. All three reservoirs are on Stanford University property.

The SUMC Sites are in a dam inundation zone from failure of the Searsville Dam. The Lagunita Reservoir is closer to the SUMC Sites (less than 1 mile away); however, the spread of water during a dam failure from Lagunita Reservoir or Felt Lake does not extend to the SUMC Sites.\textsuperscript{26}

\textbf{Searsville Reservoir.} Searsville Reservoir is the major reservoir in the San Francisquito Creek watershed. Searsville Reservoir was built in 1892 as a water supply reservoir and is in Stanford University’s Jasper Ridge Biological Preserve. Searsville Reservoir does not provide protection from flooding because it does not have an outlet works and cannot be operated as a flood control facility. Storm water runoff can only drain out of the reservoir by flowing over the spillway at the crest of the dam. Since the reservoir level cannot be lowered, it does not provide any flood storage or attenuation once it is filled by seasonal rains. The existing capacity of the reservoir is continually shrinking.

\textsuperscript{25} Federal Emergency Management Agency, National Flood Insurance Program, \textit{Flood Insurance Rate Map City of Palo Alto, Santa Clara County, Panel 4 of 10 Community Panel No. 060348 0004D}, Map revised September 6, 1989. No Letters of Map Change, indicating an amendment to the 1989 flood map, are recorded with FEMA from 1997 through 2007. FEMA Map Service Center, FEMA Issued Flood Maps, Palo Alto, City/Santa Clara County, http://msc.fema.gov/webapp/wcs/stores/servlet/CategoryDisplay?storeId=10001&catalogId=10001&langId=1&categoryId=12001&parent_category_rn=12001&type=CAT_MAPPANEL&stateId=338404&stateName=CALIFORNIA&countyName=SANTA+CLARA&communityName=PALO+ALTO%2CCTTY%2FSANTA+CLA+CO&dfirm_kit_id=&dfirmCatId=null&isCountySelected=&isCommSelected=&userType=G&urlUserType=G&sfc=0&cat_state=13011&cat_county=13288&cat_community=338404, accessed October 10, 2007.  
because of the sediment trapped behind the dam\textsuperscript{27} and has an estimated 307 acre-feet of storage capacity left of an original capacity of 692 acre-feet.\textsuperscript{28}

Searsville Dam is 68 feet high with a drainage area of 14.8 square miles.\textsuperscript{29} The dam is owned and operated by Stanford University. Searsville Dam survived the 1906 and the 1989 earthquakes with only minor damage because of its design: the dam’s individual concrete blocks interlock, which permits enough movement to dissipate seismic shock (The Crystal Springs and San Andreas dams are of similar construction). The Searsville Dam is inspected regularly by the State of California and Stanford University.\textsuperscript{30}

Tsunamis are waves caused by earthquakes that disturb the ocean floor or by large submarine landslides. A seiche is an oscillation of a body of water in an enclosed or semi-enclosed basin such as the San Francisco Bay and lakes. The City of Palo Alto Local Hazard Mitigation Plan does not identify any potential seiche hazards and since Palo Alto is not on the coast the potential for tsunami damage is believed to be low.\textsuperscript{31}

**Surface Water Quality.** Surface water quality in developed areas is affected by various point-source and nonpoint-source or diffuse-source pollutants. Point-source pollutants are those emitted at a specific point, such as a pipe, while diffuse/nonpoint-source pollutants are typically generated by surface runoff from unconfined sources, such as streets, paved areas, or landscaped areas. As a general rule, point-source pollutants are more easily monitored; thus, pollutant discharge standards (also referred to as Waste Discharge Requirements or WDRs) are more easily enforced, while nonpoint-source pollutants, such as those found in urban runoff, are more difficult to monitor and enforce. Even though nonpoint-source pollutants are difficult to monitor, they are important contributors to surface water quality, especially in developed areas.

Constituents of, and concentrations in, runoff water vary with surrounding land uses, topography, and amount of impervious cover, as well as intensity and frequency of irrigation or rainfall. Runoff in developed areas may typically contain oil, grease, and metals accumulated in streets, driveways, parking lots, and rooftops, as well as pesticides, herbicides, particulate matter, nutrients, animal waste, and other oxygen-demanding substances from landscaped areas and directly deposited on impervious

\begin{footnotesize}
\begin{itemize}
\end{itemize}
\end{footnotesize}
surfaces. Concentrations of pollutants in runoff generated during the dry season by landscape irrigation and street washing (dry-weather runoff) are typically lower than concentrations found in wet-weather runoff (runoff generated by precipitation during the wet season). However, dry weather runoff can still contribute substantially to water quality impairment.

The highest pollutant concentrations in stormwater runoff are usually generated at the beginning of the wet season, during the so-called “first-flush.” Approximately 80 percent of total accumulated pollutants are removed by the first 0.5 inch of rainfall when the percent of impervious surfaces is 70 to 90 percent, with street surfaces as the primary source of pollutants in urban areas.\textsuperscript{32}

Santa Clara Valley streams do not receive discharges from industries or municipal wastewater.\textsuperscript{33} Industrial discharges are routed to municipal sanitary sewers and then to regional municipal wastewater treatment plants that discharge to tidal sloughs of the San Francisco Bay.\textsuperscript{34} In general, average pollutant concentrations in runoff do not vary significantly from one place to another within an urbanized watershed.\textsuperscript{35} Pollutant concentrations do increase when impervious cover is more than 40 to 50 percent of the drainage area; however, runoff volume is the single most important variable for predicting pollutant loads.\textsuperscript{36}

Surface water quality is monitored by the San Francisco Bay Regional Water Quality Control Board, Region 2 (RWQCB), under the Porter-Cologne Water Quality Control Act. The RWQCB implements a Water Quality Control Plan (Basin Plan) and portions of the federal Clean Water Act (CWA) to monitor and protect water quality in the San Francisco Bay Area to achieve the maximum beneficial use possible. Once beneficial uses have been officially designated, appropriate water quality objectives can be established and programs that maintain or enhance water quality can be implemented to ensure the protection of beneficial uses. Designated beneficial uses, together with water quality objectives (referred to as water quality criteria in federal regulations), form the relevant water quality standards. Such standards are mandated for all water bodies in the State under the California Water Code. The Water Code defines water quality objectives as “the allowable limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.”


Where multiple uses exist, water quality standards must protect the most sensitive use. Water quality standards are typically numeric, although narrative criteria based upon biomonitoring methods may be employed where numerical standards cannot be established, or where they are needed to supplement numerical standards. Section 303(c)(2)(b) of the CWA requires states to adopt numerical water quality standards for toxic pollutants for which the Environmental Protection Agency (EPA) has published water quality criteria and which reasonably could be expected to interfere with designated uses in a water body (further details on the CWA and other regulations are explained under Applicable Plans and Regulations, below).

In addition to the establishment of water quality objectives, another approach for water quality improvement is a watershed-based approach that focuses on all water pollution sources and not just those traced to specific, discrete sources. If a body of water does not achieve the established water quality standards under traditional point source controls, it is listed as an impaired water body under Section 303(d) of the CWA. For 303(d) listed water bodies, a pollutant watershed budget is established, which defines the maximum amount of pollutants (or Total Maximum Daily Loads [TMDLs]) that can be received by the water body. If the sum of allowable pollutants from both point and non-point sources exceeds this maximum amount, a TMDL implementation (or clean-up) plan is required.

South San Francisco Bay. The South San Francisco Bay is listed as impaired by chlordane, DDT, dieldrin, and dioxin compounds from nonpoint sources; exotic species from ballast water; furan compound from atmospheric sources; mercury from industrial point sources, municipal point sources, resource extraction, atmospheric deposition, natural sources, and nonpoint sources; PCBs (polychlorinated biphenyls) and dioxin-like PCBs from unknown nonpoint sources; and selenium from agriculture and domestic use of groundwater.37

San Francisquito Creek. San Francisquito Creek is currently listed as impaired by diazinon from urban runoff/storm sewers and sedimentation/siltation from nonpoint sources.38 Surface water quality measurements conducted by the U.S. Geological Survey in 1996 and 1997 indicated that total dissolved solids (TDS) concentrations in San Francisquito Creek in reaches upstream of the SUMC Sites had higher levels than downstream sites, even though flows were higher and would be expected to dilute the TDS concentrations. Phosphorous at the location just downstream from the SUMC Sites was higher than either the upstream or further downstream locations, while nitrogen was the lowest just downstream from the SUMC Sites. The higher TDS, along with other water chemistry data, indicate

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that urban runoff from irrigation, other uses, or imported water constitutes most of the streamflow in the lower reaches of San Francisquito Creek during low-flow conditions.\(^{39}\)

Water quality monitoring in San Francisquito Creek upstream from the SUMC Sites has been conducted for Stanford University since 2002. Table 3.11-2 lists the annual flow and sediment load in San Francisquito Creek at Piers Lane.\(^{40}\) Table 3.11-3 lists the period of record (water year 2003 through 2007) minimum and maximum concentrations measured in San Francisquito Creek at Piers Lane.\(^{41}\)

Sedimentation is a problem in the reaches of San Francisquito Creek downstream of US 101.\(^{42}\) This reach is subject to sedimentation from tidal action, as well as deposition of sediment from upstream sources. Sediment is transported by the faster flowing upstream water, which is deposited at the change of grade at US 101 and further downstream as water slows along the lower gradient. In 1996, sediment blocked at least one-third of the flow area beneath the US 101 crossing.\(^{43}\) This sediment build-up causes a higher water surface for any given flow since it reduces the depth of the channel, which consequently reduces the drainage efficiency of the channel upstream. In the San Francisquito Creek watershed, extremely high natural sediment rates plus erosion associated with human activities are constraints for steelhead spawning and rearing.\(^{44}\)

Alteration in stream channel morphology is considered another surface water quality feature because it can contribute to stream bed and bank erosion and loss of riparian and aquatic habitat. Pertinent major contributors to potential stream channel degradation in the Santa Clara Valley include: destabilization of streambeds and banks caused by imperviousness, increased drainage density, and changes to sediment inputs; agricultural and urban encroachment on riparian corridors; and disconnection of


### Table 3.11-2
Sediment Load In San Francisquito Creek Upstream From the SUMC Sites

<table>
<thead>
<tr>
<th>Water Year</th>
<th>Sediment Load (tons)</th>
<th>Flow (acre-feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>1,741</td>
<td>1,934</td>
</tr>
<tr>
<td>2004</td>
<td>6,910</td>
<td>8,002</td>
</tr>
<tr>
<td>2005</td>
<td>9,463</td>
<td>17,627</td>
</tr>
<tr>
<td>2006</td>
<td>34,217</td>
<td>29,027</td>
</tr>
<tr>
<td>2007</td>
<td>674</td>
<td>3,533</td>
</tr>
<tr>
<td>2008</td>
<td>7,223</td>
<td>7,574</td>
</tr>
</tbody>
</table>


### Table 3.11-3
Period of Record Water Quality

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Units</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia-N</td>
<td>mg/L</td>
<td>ND</td>
<td>1.2</td>
</tr>
<tr>
<td>Nitrate-N</td>
<td>mg/L</td>
<td>0.31</td>
<td>5.5</td>
</tr>
<tr>
<td>Nitrate + Nitrite-N</td>
<td>mg/L</td>
<td>0.38</td>
<td>3.3</td>
</tr>
<tr>
<td>Phosphate-P</td>
<td>mg/L</td>
<td>0.09</td>
<td>3.98</td>
</tr>
<tr>
<td>Chlorpyrifos</td>
<td>mg/L</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Diazinon</td>
<td>mg/L</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Total Suspended Solids</td>
<td>mg/L</td>
<td>2</td>
<td>377</td>
</tr>
<tr>
<td>Hardness</td>
<td>mg/L</td>
<td>1.01</td>
<td>643</td>
</tr>
<tr>
<td>Total Aluminum</td>
<td>µg/L</td>
<td>ND</td>
<td>12,000</td>
</tr>
<tr>
<td>Dissolved Aluminum</td>
<td>µg/L</td>
<td>ND</td>
<td>190</td>
</tr>
<tr>
<td>Total Copper</td>
<td>µg/L</td>
<td>1.5</td>
<td>74.0</td>
</tr>
<tr>
<td>Dissolved Copper</td>
<td>µg/L</td>
<td>1.3</td>
<td>17.0</td>
</tr>
<tr>
<td>Total Lead</td>
<td>µg/L</td>
<td>ND</td>
<td>17.0</td>
</tr>
<tr>
<td>Dissolved Lead</td>
<td>µg/L</td>
<td>ND</td>
<td>1.10</td>
</tr>
<tr>
<td>Total Mercury</td>
<td>µg/L</td>
<td>0.0009</td>
<td>0.13</td>
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<tr>
<td>Dissolved Mercury</td>
<td>µg/L</td>
<td>ND</td>
<td>0.042</td>
</tr>
<tr>
<td>Total Nickel</td>
<td>µg/L</td>
<td>3.4</td>
<td>38.0</td>
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<tr>
<td>Dissolved Nickel</td>
<td>µg/L</td>
<td>2.6</td>
<td>9.0</td>
</tr>
<tr>
<td>Total Selenium</td>
<td>µg/L</td>
<td>0.2</td>
<td>1.3</td>
</tr>
<tr>
<td>Dissolved Selenium</td>
<td>µg/L</td>
<td>0.1</td>
<td>0.4</td>
</tr>
<tr>
<td>Total Silver</td>
<td>µg/L</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Dissolved Silver</td>
<td>µg/L</td>
<td>ND</td>
<td>0.3</td>
</tr>
<tr>
<td>Total Zinc</td>
<td>µg/L</td>
<td>ND</td>
<td>110</td>
</tr>
<tr>
<td>Dissolved Zinc</td>
<td>µg/L</td>
<td>ND</td>
<td>47</td>
</tr>
</tbody>
</table>

*Source: Balance Hydrologic’s 2007.*
streams from floodplains, caused by erosive downcutting of streambeds and by construction of channels and levees.\(^{45}\)

Imperviousness associated with urban development magnifies the peak flow and total runoff during the 1.5- to 2-year flood event,\(^{46}\) the size of flood event that most strongly influences stream characteristics.\(^{47}\)

**Groundwater.** The SUMC Sites lie over the Santa Clara Valley Groundwater Basin, Santa Clara Subbasin (Subbasin). The Subbasin occupies a structural trough parallel to the northwest trending Coast Ranges.\(^{48}\) The Diablo Range bounds the basin on the east and the Santa Cruz Mountains form the basin boundary on the west. These mountain ranges nearly converge at the Coyote Narrows, which forms the southern boundary of the Subbasin.\(^{49}\) It extends from the northern border of Santa Clara County to the groundwater divide near the town of Morgan Hill. The dominant geohydrologic feature is a large inland valley. The valley is drained to the north by tributaries to San Francisco Bay including Coyote Creek, the Guadalupe River, and Los Gatos Creek. Annual precipitation for the Subbasin ranges from less than 16 inches in the Santa Clara Valley to more than 28 inches in the upland areas.

The Subbasin is about 22 miles long and 15 miles wide with a surface area of about 225 square miles.\(^{50}\) An extensive regional aquitard\(^{51}\) occurs in the northern areas of the subbasin at depths ranging from about 100 feet near the forebay\(^{52}\) to about 150 to 250 feet in the northern areas of subbasin and beneath San Francisco Bay.\(^{53}\) The thickness of this regional aquitard varies from about 20 feet to over 100 feet. The southern area and the margins of the subbasin are unconfined areas, or forebay areas, where clay-rich zones do not restrict recharge. The general groundwater gradient is from the edges of the basin toward San Francisco Bay, or generally in the direction of ground slope.\(^{54}\)


\(^{46}\) The 1.5- to 2-year flood event is the frequency of flood event that corresponds to the flood or near-bankfull depth. The bankfull depth corresponds to stream flow just when water just begins to leave the channel and spread onto the floodplain.


\(^{51}\) An aquitard is an impermeable confining layer that hydrologically separates upper areas from lower portions. The forebay is the area where large amounts of surface water can recharge the groundwater through infiltration.


The Subbasin has two main water-bearing units; the geologically recent alluvium and the Santa Clara formation, which is described in Section 3.10, Geology, Soils, and Seismicity. The alluvium is the most important water-bearing unit in the subbasin. Its permeability generally is high and nearly all large production wells draw from this unit. A confined zone exists in the northern portion of the Subbasin where there is an overlying clay layer of low permeability (described in Section 3.10, Geology, Soils, and Seismicity). Principal aquifer zones are aquifer zones from which most water is pumped for beneficial uses. These aquifer zones are deeper than upper aquifer zones (below 150 feet bgs) and are typically under confined or semi-confined conditions. The underlying Santa Clara Formation rests on impermeable rocks (such as the Page Mill basalt) and forms the bottom of the Subbasin. Well logs indicate that the permeability of the formation increases from west to east, although in the center of the Subbasin, permeability decreases with depth.

Excessive reliance on groundwater for water supply uses in the past resulted in lowering of the groundwater table and subsequent land subsidence. The SCVWD now manages groundwater and surface water supplies to protect groundwater resources and maximize water supply reliability. Use of groundwater is currently off-set by artificial recharge in addition to natural recharge, as described below.\(^\text{55}\)

**Natural Recharge.** Natural recharge occurs principally as infiltration from streambeds that exit the upland areas in the drainage basin and from direct percolation of precipitation that falls on the basin floor.\(^\text{56}\) In the Santa Clara Subbasin, the natural recharge to the primary water supply aquifer is estimated through the use of a groundwater flow model, which produced an estimate of approximately 26,000 acre-feet of natural recharge for 2001.\(^\text{57}\)

**Artificial Recharge.** To balance groundwater extraction, the SCVWD conducts artificial recharge operations along water supply facilities, including streams and off-stream ponds.\(^\text{58}\) By releasing local and imported waters from local reservoirs or the distribution system, the SCVWD significantly enhances the recharge in these facilities. Through artificial recharge operations, approximately 129,100 acre-feet of water recharged the groundwater subbasins through water supply recharge facilities in 2001.\(^\text{59}\) Approximately 90,700 acre-feet of water recharged the Santa Clara Subbasin through artificial recharge operations; this includes 40,700 acre-feet through off-stream ponds and 50,000 acre-feet through the in-stream recharge program.\(^\text{60}\)

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Groundwater levels in the areas surrounding the SUMC Sites are about 40 to 70 feet below ground surface (bgs).\(^61\) The area is not in a natural groundwater recharge area\(^62\) or near any artificial recharge areas.\(^63\) However, estimated annual recharge from San Francisquito Creek is about 950 acre feet per year (AFY). Of this amount, about 322 AFY of recharge is from the reach of San Francisquito Creek that receives discharges from the area.\(^64\)

**Groundwater Quality.** Groundwater quality in the Santa Clara Subbasin is considered to be very good and water quality objectives are met in most wells.\(^65\) Drinking water standards are met at public supply wells without the use of treatment methods.\(^66\) Although this groundwater is only used for drinking water supplies by the City of Palo Alto during droughts and emergencies, it is used more regularly for potable water supplies by several other agencies in the SVCWD.

The mineral character of the groundwater Subbasin is dominated by calcium, magnesium, and bicarbonate. Typical TDS concentrations in the primary water supply aquifers are below the recommended drinking water standard (Maximum Contaminant Level [MCL]), which is 500 milligrams per liter (mg/L). Concentrations in the upper zones are higher, with typical concentrations ranging from 490 to 860 mg/L.\(^67\)

There is no drinking water standard for water hardness, but common problems with hard water are scaly residues on fixtures and difficulty in lathering of soaps. Water hardness concentrations of less than or equal to 60 mg/L as calcium carbonate are generally classified as ‘soft’ or ‘slightly hard’ water. Waters with hardness of 60 to 180 are considered ‘moderately hard’ to ‘hard’, and water with a hardness of over 180 is classified as ‘hard.’ Water in the Subbasin is very ‘hard’, with typical concentrations ranging from 205 to 557 mg/L.

Manganese is a naturally occurring constituent in drinking water. The drinking water standard for manganese is 50 micrograms per liter (µg/L). Manganese is not a health concern at concentrations typically found in groundwater, but can cause black to brown staining or a bitter metallic taste. Generally, manganese concentrations in the Subbasin are below drinking water standards; however,

concentrations above 50 µg/L were detected in seven wells in the principal aquifer zone, and six wells in the upper aquifer zone.68

Many of the coastal groundwater basins experience some form of saltwater encroachment into fresh water aquifers. A zone of saltwater intrusion has been observed along the San Francisco Bay, in the northern portion of the Subbasin, but currently is considered stable. The SUMC Sites are not in or near this saltwater intrusion zone.69

Nitrate in groundwater comes from both natural sources and human sources. Nitrate is very soluble in water so it readily dissolves in rainfall or irrigation water that infiltrates to groundwater. Small amounts of nitrates in groundwater (less than 10 mg/L) are normal, but higher concentrations indicate contamination. The drinking water standard for nitrate is 45 mg/L, which is based on protecting infants and others particularly sensitive to high nitrate concentrations. Typical nitrate concentrations in the principal aquifer of the Subbasin are 12 to 16 mg/L, which indicate human impacts on nitrate concentrations in groundwater. Nitrate concentrations in the upper aquifer zone, however, are typically less than 10 mg/L.70 Consequently, the lower aquifer contamination is considered to be from historic nitrate sources rather than on-going contamination.

Iron, fluoride, turbidity, boron, and other inorganic constituents generally do not exceed drinking water standards where applicable. No organic radiological constituents exceeded drinking water standards in the Santa Clara Subbasin.71

Contaminated groundwater is usually caused by land uses that resulted in releases of hazardous materials or hazardous wastes into soils or sewer systems or by naturally occurring geochemistry. Leaking underground storage tanks, pipes, and sumps are common causes of such contaminated conditions, as are historic industrial activities that routinely include spills, disposal, or intentional discharges of hazardous materials or waste. Portions of the area surrounding the SUMC Sites contain known hazardous materials contamination. See Section 3.12, Hazardous Materials, for further explanation of these issues.

Climate, topography, geology, and land use can all affect groundwater conditions. Fill soils can be composed of a variety of materials of various quality. Rainfall percolation though these materials can pick up various constituents as it is infiltrating, and carry these constituents to the groundwater. However, the soils in the area have low permeabilities (stiff clays and dense, compacted sands); consequently, precipitation is more likely to flow overland than infiltrate to groundwater.

SUMC Sites

Site-specific hydrology and water quality characteristics related to the SUMC Sites are described below.

**Ground Features.** Soils at the Main SUMC Site are composed of sand, clay, and gravel. Soils at the Hoover Pavilion Site are composed of a layer of fill (silt, sand, and gravel), underlain by layers of deposited sand and gravels with varying amounts of silt at 25 to 35 feet bgs and silt, clay, and clayey sand at about 38 to 40 feet bgs. The SUMC Sites are in a Hydromodification Management Plan (HMP) area defined as less than 65 percent impervious surfaces and 90 percent built out, although the estimated amount of impervious surfaces on the SUMC Sites is approximately 70 percent, or about 49 acres. The existing uses consist primarily of medical buildings (containing clinical, research, and hospital uses), parking lots and garages, and roadways, with landscaping (about 27 percent of the area with an additional 3 percent of green roofs) (see Section 2, Project Description).

**Surface Water Drainage.** The SUMC Sites are flat (slope is less than one percent at both the Main SUMC Site and the Hoover Pavilion Site) and overland flow generally drains towards the east. The majority of runoff from the Main SUMC Site is collected in the Stanford University local storm drainage system and conveyed to the Sand Hill Road trunk line that discharges at one location to San Francisquito Creek. This storm drain system has capacity to accommodate runoff from the 6-hour 10-year storm event (see Section 3.15, Utilities, of this EIR). Runoff from the Hoover Pavilion Site is conveyed in a local Stanford University storm drain system that is then routed into the Stanford Shopping Center area of the City of Palo Alto San Francisquito Creek Storm Drain system, prior to discharge at one location into San Francisquito Creek. San Francisquito Creek is about 0.25 miles north of the Main SUMC Site and 0.3 miles north of the Hoover Pavilion Site.

**Groundwater.** Groundwater in the area is typically a layered aquifer with the shallowest aquifer being an unconfined water table aquifer. Below this layer are multiple layers that are considered semi-confined to confined aquifers. The shallowest aquifer, which would most directly impact or be

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75 Stanford University Medical Center, Stanford University Medical Center Facilities Renewal and Replacement Project Application, August 2007, as amended; Tab 4, Figure 4-8a.
77 EIP Associates, *Certified Environmental Impact Report Stanford Sand Hill Road Corridor Projects: Volume 3*, Figure 4.9-2 Storm Drainage Outfalls along the Sand Hill Road Corridor, June 1996, p. 4.9-11.
78 EIP Associates, *Draft Environmental Impact Report Stanford Sand Hill Corridor Projects, Volume 2*, Figure 3-9 Storm Drain Map, July 1996, p. 3-17.
impacted by construction on the SUMC Sites, is affected by seasonal rainfall.\textsuperscript{80} Groundwater encountered at the Main SUMC Site is over 50 feet bgs.\textsuperscript{81} The historical groundwater level at the Main SUMC Site is below 30 feet bgs.\textsuperscript{82} Based on field evaluations and historic data, the design groundwater depth is recommended to be 30 feet bgs.\textsuperscript{83} At the Hoover Pavilion Site, groundwater movement is primarily to the south\textsuperscript{84} and the depth to groundwater is about 38-53 feet bgs.\textsuperscript{85,86,87} An aquitard is present at about 51.5 to 60.5 feet bgs.\textsuperscript{88}

**Soil and Groundwater Quality.** Three underground storage tanks containing diesel and waste oil were found to have contaminated local soil and groundwater at the Hoover Pavilion Site (see Section 3.12, Hazardous Materials, for more information). The main constituent of concern is primarily degraded TPH-D (diesel fuel). Two tanks have since been closed in place and one removed.\textsuperscript{89} An additional waste oil tank was not found to be leaking and closed in place. Passive free-product removal (natural attenuation) is used for remediation of soil and groundwater because vertical and lateral spread are stable, the extent of contamination is known, groundwater movement is understood, and no groundwater supply wells are within 0.5 mile of the site.\textsuperscript{90}

**Applicable Plans and Regulations**

This section describes the federal, State, and local regulations and policies that are applicable to the SUMC Project.

\textsuperscript{80} Protech Consulting Engineers, *Phase I Environmental Site Assessment Conducted at Welch Road, Palo Alto, California, November 1998*, prepared for the Stanford Management Company, p. 5-2.
\textsuperscript{87} Geomatrix, *Phase I Environmental Assessment: Hoover Pavilion 211 and 215 Quarry Road Palo Alto, California*, September 2007, p. 3.
Federal Regulations

Clean Water Act. The federal CWA was enacted with the primary purpose of restoring and maintaining the chemical, physical, and biological integrity of the nation’s waters. The CWA directs states to establish water quality standards for all “waters of the United States” and to review and update such standards on a triennial basis. Section 319 mandates specific actions for the control of pollution from non-point sources. The EPA has delegated responsibility for implementation of portions of the CWA, including water quality control planning and control programs, such as the National Pollutant Discharge Elimination System (NPDES) Program, to the State Water Resources Control Board and the Regional Water Quality Control Board. These programs are explained in more detail in the State Regulations section.

Section 303(c)(2)(b) and Water Quality Standards. Section 303(c)(2)(b) of the CWA requires states to adopt water quality standards for all surface waters of the United States based on the water body’s designated beneficial use. Where multiple uses exist, water quality standards must protect the most sensitive use. Water quality standards are typically numeric, although narrative criteria based upon biomonitoring methods may be employed where numerical standards cannot be established or where they are needed to supplement numerical standards. Water quality standards applicable to the SUMC Project are listed in the Water Quality Control Plan for the San Francisco Bay Basin (SFB Basin Plan).

Section 303(d) and Total Maximum Daily Loads. Section 303(d) of the CWA bridges the technology-based and water quality-based approaches for managing water quality. Section 303(d) requires that states make a list of waters that are not attaining standards after the technology-based limits are put into place. For waters on this list (and where the U.S. EPA administrator deems they are appropriate), states are to develop TMDL. TMDLs are established at the level necessary to implement the applicable water quality standards. A TMDL must account for all sources of the pollutants that caused the water to be listed. Federal regulations require that the TMDL, at a minimum, account for contributions from point sources (federally permitted discharges, discrete conveyances) and contributions from nonpoint sources (everything other than point sources). Specific TMDLs applicable to the SUMC Project are explained under Regional Regulations, below.

National Pollutant Discharge Elimination System. The goal of the NPDES nonpoint source regulations is to improve the quality of stormwater discharged to receiving waters to the “maximum extent practicable” through the use of best management practices (BMPs). The NPDES permit system was established in the CWA to regulate point source discharges (a municipal or industrial discharge at a specific location or pipe) and certain types of diffuse discharges. As defined in the federal regulations, nonpoint sources are generally exempt from federal NPDES permit program requirements. Nonpoint pollution sources are diffuse and originate over a wide area rather than from a definable point. Nonpoint source pollution often enters receiving water in the form of surface runoff and is not conveyed by way of pipelines or discrete conveyances. Urban stormwater runoff and construction site runoff, however, are diffuse-sources regulated under the NPDES permit program because they discharge to receiving waters at discrete locations. Sections 401 and 402 of the CWA contain general
requirements regarding NPDES permits. Section 307 of the CWA describes the factors that the U.S.
EPA must consider in setting effluent limits for priority pollutants.

For point-source discharges, each NPDES permit contains limits on allowable concentrations and mass
emissions of pollutants contained in the discharge; however, the SUMC Sites would not be considered
a point source for regulatory purposes. No features of the SUMC Project would be considered a point
source discharge that could require an individual NPDES permit, unless substantial dewatering is
required.

For diffuse-source discharges (e.g., municipal stormwater and construction runoff), the NPDES
program establishes a comprehensive stormwater quality program to manage urban stormwater and
minimize pollution of the environment to the maximum extent practicable. The NPDES program
consists of: (1) characterizing receiving water quality; (2) identifying harmful constituents;
(3) targeting potential sources of pollutants; and (4) implementing a Comprehensive Stormwater
Management Program. The SUMC Project is subject to the Municipal NPDES Permit for the Santa
Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), explained below under
Regional Regulations.

State Regulations

Responsibility for the protection of water quality in California rests with the State Water Resources
Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs). The SWRCB
establishes statewide policies and regulations for the implementation of water quality control programs
mandated by federal and State water quality statutes and regulations. The RWQCBs develop and
implement Water Quality Control Plans (Basin Plans) that consider regional beneficial uses, water
quality characteristics, and water quality problems. In cases where the Basin Plan does not contain a
standard for a particular pollutant, other criteria are used to establish a standard. Other criteria may be
applied from SWRCB documents (e.g., the Inland Surface Waters Plan and the Pollutant Policy
Document, California Toxics Rule) or from EPA water quality criteria developed under Section 304(a)
of the CWA. Numeric criteria are required by the CWA for many priority toxic pollutants. To fill in
the gap between the water quality control plans and CWA requirements, on May 18, 2000 the EPA
promulgated the California Toxics Rule based on the Administrator’s determination that numeric
criteria are necessary in the State of California to protect human health and the environment. These
federal criteria are numeric water quality criteria for priority toxic pollutants and other provisions for
water quality standards, legally applicable in the State of California, for inland surface waters, enclosed
bays, and estuaries for all purposes and programs under the CWA.

As explained earlier in this section, water quality standards that apply to the San Francisco Bay Area
waters are listed in the SFB Basin Plan. The SUMC Sites discharge into San Francisquito Creek,
which flows into the San Francisco Bay South. San Francisquito Creek and San Francisco Bay South
are listed as impaired for certain pollutants and the CWA thus requires development of limits (TMDL)
to the amount of these pollutants that can be discharged to San Francisquito Creek and the San
Francisco Bay South.
**Porter-Cologne Water Quality Control Act.** The Porter-Cologne Water Quality Control Act establishes the SWRCB and each RWQCB as the principal State agencies for coordinating and controlling water quality in California. Specifically, the Porter-Cologne Act authorizes the SWRCB to adopt, review, and revise policies for all waters of the State (including both surface and groundwaters) and directs the RWQCBs to develop regional Basin Plans. Section 13170 of the California Water Code authorizes the SWRCB to adopt water quality control plans on its own initiative.

The San Francisco Bay RWQCB has the authority to implement water quality protection standards through the issuance of permits for discharges to waters in its jurisdiction. Water quality objectives for the San Francisco Bay and its tributaries are specified in The San Francisco Bay Basin Water Quality Control Plan (SFB Basin Plan) prepared by the RWQCB in compliance with the federal CWA and the State Porter-Cologne Act. The principal elements of the SFB Basin Plan are a statement of beneficial water uses protected under the plan; water quality objectives necessary to protect the designated beneficial water uses; and strategies and time schedules for achieving the water quality objectives. Together, narrative and numerical objectives define the level of water quality that shall be maintained in the region. In instances where water quality is better than that prescribed by the objectives, the State Antidegradation Policy applies (State Board Resolution 68-16: Statement of Policy with Respect to Maintaining High Quality of Waters in California). This policy is aimed at protecting relatively uncontaminated aquatic systems where they exist and preventing further degradation. The State Antidegradation Policy is consistent with the federal Antidegradation Policy, as interpreted by the SWRCB in State Board Order No. 86-17.

The water quality objectives are achieved primarily through the establishment and enforcement of waste discharge requirements. Because the SUMC Sites are in the San Francisco RWQCB’s jurisdiction, all discharges to surface water or groundwater are subject to the SFB Basin Plan requirements.

**Waste Discharge Requirements.** All discharges of waste to waters of the State are subject to regulation under the Porter-Cologne Act. This includes both point and nonpoint source discharges. Non-point source discharges are regulated under Waste Discharge Requirements (WDRs), waivers of WDRs, a basin plan prohibition, or some combination of these administrative tools. Discharges of waste directly to State waters would be subject to an individual NPDES permit, which serves as a WDR. The SUMC Project is subject to the Municipal NPDES Permit and the Construction General Permit, which both serve as WDRs as well. The SUMC Project may be subject to an individual WDR or NPDES permit if construction dewatering is required.

The RWQCBs have primary responsibility for issuing WDRs. The RWQCBs may issue individual WDRs to cover individual discharges or general WDRs to cover a category of discharges. WDRs may include effluent limitations or other requirements that are designed to implement applicable water quality control plans, including designated beneficial uses and the water quality objectives established to protect those uses and prevent the creation of nuisance conditions. Violations of WDRs may be addressed by issuing Cleanup and Abatement Orders (CAOs) or Cease and Desist Orders (CDOs), assessing administrative civil liability, or seeking imposition of judicial civil liability or judicial injunctive relief.
NPDES General Construction Activity Stormwater Permit (Construction General Permit). The SWRCB permits all regulated construction activities under NPDES General Permit for Storm Water Discharges Associated with Construction Activity (Order No. 2009-0009-DWQ, NPDES No. CAR000002), adopted September 2, 2009. Every construction project that disturbs one or more acres of land surface or that are part of a common plan of development or sale that disturbs more than one acre of land surface would require coverage under this Construction General Permit. To obtain coverage under this Construction General Permit, the landowner or other applicable entity must file Permit Registration Documents (PRDs) prior to the commencement of construction activity, which include a Notice of Intent (NOI), Storm Water Pollution Prevention Plan (SWPPP), and other documents required by the Construction General Permit, and mail the appropriate permit fee to the State Water Board. Every regulated construction project, including those that are already covered under the old permit (Water Quality Order No. 98-08-DWQ), would have to get coverage under this current Construction General Permit by July 1, 2010 – this would require a new SWPPP in accordance with revised permit. Because the Project would cumulatively disturb more than one acre, construction of the Project would be subject to this Construction General Permit requirements.

Construction activities subject to the Construction General Permit include clearing, grading, and disturbances to the ground, such as stockpiling or excavation, that result in soil disturbances of at least one acre of total land area. The SWPPP has two major objectives: (1) to help identify the sources of sediment and other pollutants that affect the quality of stormwater discharges; and (2) to describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in stormwater as well as non-stormwater discharges. BMPs are intended to reduce impacts to the Maximum Extent Practicable (MEP), which is a standard created by Congress to allow regulators the flexibility necessary to tailor programs to the site-specific nature of municipal stormwater discharges. Reducing impacts to the MEP generally relies on BMPs that emphasize pollution prevention and source control, with additional structural controls as needed.

This current Construction General Permit differs from Order No. 99-08-DWQ in the following significant ways:

- **Rainfall Erosivity Waiver:** this General Permit includes the option allowing a small construction site (>1 and <5 acres) to self-certify if the rainfall erosivity value (R value) for their project’s given location and time frame compute to be less than or equal to 5.

- **Technology-based Numeric Action Levels (NALs):** the General Permit includes NALs for pH and turbidity for Risk Level 2 projects.

- **Technology-based Numeric Effluent Limitations (NELs):** this General Permit contains NELs for pH during any construction phase where there is a high risk of pH discharge and turbidity for all discharges in Risk Level 3. The daily average NEL for turbidity is set at 500 NTU to represent the minimum technology that sites need to employ (to meet the traditional Best Available Technology Economically Achievable (BAT)/ Best Conventional Pollutant Control Technology (BCT) standard and the traditional, numeric receiving water limitations for turbidity.
• Risk-based Permitting Approach: this General Permit establishes three levels of risk possible for a construction site. Risk is calculated in two parts: 1) Project Sediment Risk, and 2) Receiving Water Risk.

• Minimum Requirements Specified: this General Permit specifies more minimum BMPs and requirements that were previously only required as elements of the SWPPP or were suggested by guidance.

• Project Site Soil Characteristics Monitoring and Reporting: this General Permit provides the option for dischargers to monitor and report the soil characteristics at their project location. The primary purpose of this requirement is to provide better risk determination and eventually better program evaluation.

• Effluent Monitoring and Reporting: this General Permit requires effluent monitoring and reporting for pH and turbidity in stormwater discharges. The purpose of this monitoring is to be used to determine compliance with the NELs and evaluate whether NALs included in this General Permit are exceeded.

• Receiving Water Monitoring and Reporting: this General Permit requires some Risk Level 3 dischargers to monitor receiving waters and conduct bioassessments.

• Post-Construction Storm Water Performance Standards: this General Permit specifies runoff reduction requirements for all sites not covered by a Phase I or Phase II Municipal Separate Storm Sewer System (MS4) NPDES permit, to avoid, minimize, and/or mitigate post-construction storm water runoff impacts.

• Rain Event Action Plan: this General Permit requires certain sites to develop and implement a Rain Event Action Plan (REAP) that must be designed to protect all exposed portions of the site within 48 hours prior to any likely precipitation event.

• Annual Reporting: this General Permit requires all projects that are enrolled for more than one continuous three-month period to submit information and annually certify that their site is in compliance with these requirements. The primary purpose of this requirement is to provide information needed for overall program evaluation and public information.

• Certification/Training Requirements for Key Project Personnel: this General Permit requires that key personnel (e.g., SWPPP preparers, inspectors, etc.) have specific training or certifications to ensure their level of knowledge and skills are adequate to ensure their ability to design and evaluate project specifications that will comply with General Permit requirements.

• Linear Underground/Overhead Projects: this General Permit includes requirements for all Linear Underground/Overhead Projects (LUPs).

Risk levels are based on a matrix of project sediment risk and receiving water risk.

• Sediment risk is based on estimated soil loss, as calculated by the Revised Universal Soil Loss Equation (RUSLE) where: soil loss of less than 15 tons/acre is considered low risk; soil loss
between 15 and 75 is medium risk; and, Soil loss over 75 acres is considered high risk. Receiving water risk is based on whether a project drains to a sediment-sensitive waterbody.

- A sediment-sensitive waterbody is either on the most recent 303d list for waterbodies impaired for sediment; has a USEPA-approved Total Maximum Daily Load implementation plan for sediment; or has the beneficial uses of cold freshwater habitat, fish spawning, and fish migration.

- There are three levels of risk; Risk Level 1 projects will be subject to minimum BMP and visual monitoring requirements; Risk Level 2 projects will be subject to NALs and some additional monitoring requirements; and Risk Level 3 projects will be subject to NELs and more rigorous monitoring requirements such as receiving water monitoring and in some cases bioassessment. Discharge to sediment-sensitive waterbody is automatically at least a Risk Level 2.

Because the SUMC Project discharges to San Francisquito Creek that has been listed as impaired by sediment (2006 303(d) list), it would automatically be classified as either a Risk Level 2 or 3 project, depending upon the calculated erosion potential.

**TMDLs – State Application.** States are required to assess waters for impairment every two years and develop TMDLs for waterbodies listed as impaired on the 303(d) list, approved by the U.S. EPA. The current approved 303(d) list is the 2006 list, which was approved by the U.S. EPA in June 27, 2007. The 303(d) list includes the pollutant(s) contributing to impairment, sources of impairment, and a completion date for development of TMDLs. In California, the SWRCB has interpreted State law to require that implementation be addressed when TMDLs are incorporated into Basin Plans.

**Regional Regulations**

**San Francisco Bay Basin (Region 2) Water Quality Control Plan (SFB Basin Plan).** The San Francisco RWQCB implements a number of federal and State laws, the most important of which are the State Porter-Cologne Water Quality Control Act and the federal CWA. Discharges from the SUMC Sites to surface and ground waters are subject to the SFB Basin Plan requirements including both narrative and numeric water quality objectives.

Designated beneficial uses and associated water quality objectives have been established for San Francisquito Creek, San Francisco Bay South, and the Santa Clara Subbasin in the 2004 SFB Basin Plan prepared by the SFRWQCB, in compliance with the federal CWA and the State Porter-Cologne Water Quality Control Act. The SFB Basin Plan has designated existing and potential beneficial uses for San Francisquito Creek and the San Francisco Bay South. Designated beneficial uses for San Francisquito Creek include cold freshwater habitat; fish migration and spawning; warm freshwater habitat; and wildlife habitat. Potential beneficial uses are water contact and noncontact water

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recreation.\textsuperscript{92} The San Francisco Bay South beneficial uses include industrial service supply; ocean, commercial, and sport fishing; estuarine habitat; fish migration; presence of rare and endangered species; wildlife habitat; water contact and nonwater contact recreation; and navigation. Fish spawning also is identified as a potential beneficial use. Designated beneficial uses for the Santa Clara Subbasin are listed in the SFB Basin Plan and include municipal and domestic supply; industrial process supply, industrial service supply, and agriculture.\textsuperscript{93}

Because the Project’s construction would extend through 2021, discharges from the SUMC Project to San Francisquito Creek or the San Francisco Bay South would be subject to the existing Urban Creeks Pesticide Toxicity TMDL, and San Francisco Bay Mercury TMDLs. On June 22, 2007, SFRWQCB staff released a proposed Basin Plan amendment and supporting staff report incorporating a TMDL for PCBs in all segments of San Francisco Bay. This TMDL has not yet been approved by the SWRCB. The San Francisquito Creek Sediment TMDL was scheduled for completion in 2008;\textsuperscript{94} however, it has not yet been completed. TMDLs for the rest of the listed pollutants in San Francisquito Creek and the San Francisco Bay South are scheduled for completion by 2019.\textsuperscript{95} Additionally, San Francisquito Creek has been proposed for requiring a trash TMDL.\textsuperscript{96} Because construction would extend through 2018, the SUMC Project may be subject to TMDLs for all the other pollutants on the 2006 303(d) list for these water bodies.

\textit{Urban Creeks Pesticide Toxicity TMDL.} The SFB Basin Plan amendment incorporating a TMDL and water quality attainment strategy for diazinon and pesticide-related toxicity in the Bay Area’s urban creeks has been approved by the SWRCB, the Office of Administrative Law, and the U.S. EPA. It was adopted by the RWQCB on November 16, 2005 (Final Resolution #R2-2005-0063). Although the U.S. EPA phased out urban diazinon applications at the end of 2004, other pesticides may now pose potential water quality and sediment quality concerns because they are used as diazinon replacements and because pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that threaten water quality.

The numeric targets interpret the applicable narrative objectives in terms of quantitatively measurable water quality parameters. This target shall be met at all urban creek locations, including those near storm drain outfalls where urban runoff enters receiving waters. The diazinon concentration target is

\textsuperscript{92} California Regional Water Quality Control Board, San Francisco Bay Region. \textit{San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).} Table 2-1 Existing and Potential Beneficial Uses of Water Bodies in the San Francisco Bay Region. January 18, 2007.


\textsuperscript{96} San Francisco Bay Regional Water Quality Control Board, February 11, 2009.
as follows: diazinon concentrations in urban creeks shall not exceed 100 nanograms per liter (ng/l) as a one-hour average. The target addresses both acute and chronic diazinon-related toxicity.

NPDES permits for urban runoff management agencies and similar entities responsible for controlling urban runoff shall require implementation of BMPs and control measures for urban pesticides. Requirements in each NPDES permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce pesticides in urban runoff. Control measures implemented by urban runoff management agencies and other entities (except construction and industrial sites) shall reduce pesticides in urban runoff to the maximum extent practicable. If these requirements prove inadequate to meet the targets and allocations, the SWRCB will require additional control measures or call for additional actions by others until the targets and allocations are attained.

San Francisco Bay Mercury TMDL. A regional mercury TMDL was prepared and approved by the RWQCB in 2004. On July 17, 2007, the SWRCB approved this TMDL as a Basin Plan Amendment (SWRCB Resolution No. 2007-0045). To achieve the human health and wildlife targets and to attain water quality standards, the Bay-wide suspended sediment mercury concentration target is 0.2 milligrams of mercury per kilogram of dry sediment. The human health target is a fish tissue mercury concentration (0.2 milligrams of mercury per kilogram of fish tissue).

The year 2003 estimate of total mercury inputs to the San Francisco Bay is about 1,220 kilograms per year (kg/yr). The Bay would attain applicable water quality standards for mercury when the overall mercury load is reduced to the TMDL (700 kg/yr) and mercury methylation control measures are implemented. The Santa Clara Valley Urban Runoff Pollution Prevention Program allocation is 23 kg/year and the load reduction is 21 kg/yr. The City of Palo Alto load allocation is 0.38 kg/yr and the City interim and final load allocation is 0.31 kg/yr (0.07 kg/yr load reduction).

The wasteload allocations are implemented through the NPDES stormwater permits issued to urban runoff management agencies. The NPDES permits for urban runoff management agencies require the implementation of BMPs and control measures designed to achieve the allocations or accomplish the load reductions derived from the allocations. In addition to controlling mercury loads, BMPs or control measures shall include actions to reduce mercury-related risks to humans and wildlife.

California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (Municipal Regional Permit). The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) is an association of 13 cities and towns in the Santa Clara Valley, together with Santa Clara County and the Santa Clara Valley Water District (Santa Clara Permittees). The Santa Clara Permittees, along with the Contra Costa Permittees, San Mateo Permittees, Alameda Permittees, Fairfield-Suisun Permittees, and Vallejo Permittees are all permitted under Phase I for municipal stormwater and urban runoff discharges under NPDES Permit No. CAS612008, Order No. Order R2-2009-0074, adopted October 14, 2009. One of the primary objectives of the regulations for pollutant dischargers is the reduction of pollutants in urban stormwater through the use of structural and nonstructural BMPs. The Municipal Regional Permit requires the Permittees, including the City of Palo Alto and unincorporated areas of Santa Clara County, to
addresses eight general control measures associated with construction and operational activities, including (1) public education and outreach; (2) public participation/involvement; (3) illicit discharge detection and elimination; (4) construction site stormwater runoff control for sites greater than 1 acre; (5) post-construction stormwater management in new development and redevelopment; and (6) pollution prevention/good housekeeping for municipal operations, (7) water quality monitoring; and (8) implementation of controls to meet TMDLs. These control measures are implemented through the use of BMPs.

Regulated Projects, as defined in the Municipal Regional Permit (Provision C.3.b.), are required to implement Low Impact Development (LID) source control BMPs, site design BMPs, and stormwater treatment BMPs, onsite or at a joint stormwater treatment facility in accordance with Provisions C.3.c and C.3.d, unless the Provision C.3.e alternate compliance options are evoked. Regulated Projects must provide permanent/post-construction treatment controls for stormwater according to specific calculations. Regulated Projects include development or redevelopment projects, such as public projects, that create or replace 10,000 square feet and greater of impervious surfaces. If redevelopment results in an alteration of more than 50 percent of the existing impervious surfaces, permanent BMPs must be implemented to treat runoff from the entire project site. The SUMC Project would create or replace more than 10,000 square feet of impervious surfaces and likely alter more than 50 percent of the existing impervious surfaces. Therefore the SUMC Project would be a Regulated Project and likely subject to requiring water quality BMPs for the entire SUMC Sites.

- Low Impact Development (LID) (C.3.c). The goal of LID is to reduce runoff and mimic a site’s predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. All Regulated Projects must comply with minimum LID requirements.

In accordance with the Municipal Regional Permit Provision C.3.c.i. Low Impact Development (LID), as a Regulated Project, the SUMC Project would have to comply with the following minimum LID requirements, unless all discretionary permits have been obtained by December 1, 2011:

(1) Source Control Requirements. All Regulated Projects must implement source control measures onsite that at a minimum, shall include the following:

(a) Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency’s authority and standards:

- Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants;
- Dumpster drips from covered trash, food waste and compactor enclosures;
• Discharges from covered outdoor wash areas for vehicles, equipment, and accessories;

• Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and

• Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option;

(b) Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas;

(c) Properly designed trash storage areas;

(d) Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping;

(e) Efficient irrigation systems; and

(f) Storm drain system stenciling or signage.

(2) Site Design and Stormwater Treatment Requirements.

(a) Each Regulated Project shall be required to implement at least the following design strategies onsite:

(i) Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;

(ii) Conserve natural areas, including existing trees, other vegetation, and soils;

(iii) Minimize impervious surfaces;

(iv) Minimize disturbances to natural drainages; and

(v) Minimize stormwater runoff by implementing one or more of the following site design measures:

• Direct roof runoff into cisterns or rain barrels for reuse.

• Direct roof runoff onto vegetated areas.

• Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.

• Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.

• Construct sidewalks, walkways, and/or patios with permeable surfaces.
- Construct driveways, bike lanes, and/or uncovered parking lots with permeable surfaces.

(b) Each Regulated Project must treat 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project’s drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

(i) LID treatment measures are harvesting and re-use, infiltration, evapotranspiration, or biotreatment.

(ii) A properly engineered and maintained biotreatment system may be considered only if it is infeasible to implement harvesting and re-use, infiltration, or evapotranspiration at a project site.

(iii) Infeasibility to implement harvesting and re-use, infiltration, or evapotranspiration at a project site may result from conditions including the following:
- Locations where seasonal high groundwater would be within 10 feet of the base of the LID treatment measure.
- Locations within 100 feet of a groundwater well used for drinking water.
- Development sites where pollutant mobilization in the soil or groundwater is a documented concern.
- Locations with potential geotechnical hazards.
- Smart growth and infill or redevelopment sites where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.
- Locations with tight clay soils that significantly limit the infiltration of stormwater.

(vi) Biotreatment systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches per hour stormwater runoff surface loading rate.

(vii) Green roofs may be considered biotreatment systems that treat roof runoff only if they meet certain minimum specifications submitted by the Permittees and approved by the RWQCB.

- Numeric Sizing Criteria for Stormwater Treatment Systems (C.3.d). Stormwater treatment measures must be numerically sized in accordance with criteria identified under Provision C.3.d. The permittees must also verify that infiltration devices are designed and installed such that they would not cause or contribute to the degradation of groundwater quality at project sites. An infiltration device is any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil. Specific requirements are specified in Provision C.3.d.iv.(2).
Hydromodification Management (C.3.g). For projects where increased flow and/or volume is likely to cause increased erosion of creek beds and banks, silt pollutant generation, or other impacts to beneficial uses, NPDES permit provisions require managing such increases in peak runoff flow and increased runoff volume. A Hydromodification Management (HM) Project is a Regulated Project that creates and/or replaces one acre or more of impervious surface and are not specifically excluded within the requirements of Attachments B–F of the Municipal Regional Permit. HM Projects are subject to the HM Standard such that stormwater discharges from HM Projects shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition. A project that does not increase impervious surface area over the pre-project condition is not an HM Project. The SUMC Sites are located within an HM exempt area on the County HM map and the SUMC Project would not increase impervious area over the pre-project condition. Therefore, the SUMC Project is not an HM Project subject to the HM Standard or HM controls.

Additionally, this Municipal Regional Permit incorporates requirements for TMDLs and other pollutant source load reductions within the San Francisco Bay Region including: Pesticides Toxicity Control (C.9.), Trash Load Reduction (C.10.), Mercury Controls (C.11.), Polychlorinated Biphenyls (PCBs) Controls (C.12.), Copper Controls (C.13.), Polybrominated Diphenyl Ethers (PBDE), Legacy Pesticides and Selenium (C.14.).

Santa Clara Valley Water District (SCVWD). The SCVWD reviews plans for land development projects near streams for proposed on-site drainage systems, wastewater disposal systems, and potable water supply, as well as for all new or upgraded facilities that may be required off site in the City of Palo Alto or County as a result of the development (see further explanation under NPDES permit, above). The SCVWD reviews projects for conformance with SCVWD flood control design criteria, stream maintenance and protection plans, and groundwater protection programs. The SCVWD coordinates its efforts with federal, State, other Santa Clara County and City agencies such as FEMA, San Francisco RWQCB, and the Department of Environmental Health, to promote health and safety through the effective management of water resources. Groundwater in the basin is managed through the Groundwater Management Plan (2001).

City of Palo Alto Comprehensive Plan. The applicable policies are addressed in Section 2, Project Description, and Section 3.2, Land Use.

City of Palo Alto Municipal Code. Three chapters of the Municipal Code containing directives related to the quality and quantity of off-site water discharge are in Title 16 – Building Regulations: Chapter 16.09 – Sewer Use Ordinance, Chapter 16.11 – Stormwater Pollution Prevention, and Chapter 16.28 - Excavations, Grading, and Fills. These chapters are explained in more detail below.

Sewer Use Ordinance. The overall goal of Chapter 16.09 is to prevent/control pollution and protect/foster human health and the environment. The specific purpose is to prevent the discharge of any pollutant into the sewer system, the storm drain system, or surface waters, which would obstruct or damage the collection system; interfere with, inhibit or disrupt the Palo Alto Regional Water Quality Control Plant, its treatment processes, operations, or sludge
processes, use or disposal; pass through the treatment system and contribute to violations of the regulatory requirements placed upon the plant; or result in harm to or threaten to deteriorate human health or the environment.

- **Stormwater Pollution Prevention.** Chapter 16.11 is necessary to protect the health and safety of the residents of Palo Alto and the surrounding region from water quality degradation caused by stormwater runoff. Chapter 16.11 is implemented in a manner consistent with the requirements of the San Francisco RWQCB and is supplemental to the requirements of Chapter 16.09 with respect to stormwater.

- **Excavations, Grading, and Fills.** The City’s erosion and sediment control ordinance is contained in Chapter 16.28, *Excavations, Grading, and Fills*, of the Municipal Code. The Projects would require a *Grading and Excavation Permit*. All land-disturbing or land-filling activities or soil storage must be undertaken in a manner designed to reduce surface runoff, erosion, and sedimentation to a minimum amount. An interim erosion and sediment control plan and SWPPP are required and must contain descriptions of surface runoff and erosion control measures to be implemented. The final erosion and sediment control plan and SWPPP must include a description of permanent control measures to improve the quality of stormwater runoff from the sites.

- **Palo Alto Regional Water Quality Control Plan Enforcement Response Plan.** Stanford University has, in a written contract, agreed to comply with the Palo Alto Sewer Use Ordinance and the federal (EPA) Pretreatment Standards, even though most of the campus lies outside of the City of Palo Alto limits in an unincorporated area of Santa Clara County. Therefore, the same procedures are used for enforcement on the Stanford Campus as are used for industrial facilities.

**City of Palo Alto Urban Runoff Management Plan.** The City of Palo Alto Urban Runoff Management Plan (URMP), revised June 4, 2007, includes performance standards for meeting requirements of the Municipal NPDES Permit. The SUMC Project is a Group 1 Project subject to the URMP requirements for construction and operation performance standards. These are described in more detail in the impact analysis.

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97 The SUMC Project is a Significant Redevelopment project, and as such, is a Group 1 project. Where there is an increase or replacement of more than 50 percent of the impervious surface of a previously existing development, and the existing development was not subject to stormwater treatment measures, the entire project site must be included in the treatment measure design.
Impacts and Mitigation Measures

Significance Criteria

Based on significance thresholds determined by the City of Palo Alto, the SUMC Project would result in a significant drainage or water quality impact if it would:

- Substantially impede or redirect flood flows through placement of structures in the 100-year flood hazard area;
- Substantially degrade or deplete groundwater resources or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;
- Substantially increase the rate, volume, or flow duration of stormwater runoff or alter the existing drainage pattern or the site or area, including altering the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site, including increased in-stream erosion;
- Significantly increase the rate, volume, or flow duration of stormwater runoff in a manner which would result in new or increased flooding on- or off-site, or exceedance of the capacity of existing or planned stormwater drainage systems in local streams;
- Provide substantial additional sources of pollutants associated with urban runoff or otherwise substantially degrade surface or groundwater quality;
- Expose people or structures to a significant risk or loss, injury or death involving flooding by placing housing or other development in a 100-year flood hazard area or a levee or dam failure inundation area;
- Result in stream bank instability; or
- Violate any water quality standards or waste discharge requirements.

Environmental Analysis

HW-1. Flood Risk and Flood Flows. The SUMC Project would have no impact on flood risk or flood flows. (NI)

The SUMC Sites are not in a 100-year flood hazard area and, therefore, placement of structures on the SUMC Sites would not impede or redirect flood flows. There would be no impact.

HW-2. Groundwater Recharge and Local Water Table. The SUMC Project would have a less-than-significant impact on groundwater recharge and the local groundwater table level. (LTS)

Construction. The SUMC Project could affect the local groundwater table levels if groundwater dewatering were implemented for construction of underground structures.
Additionally, the SUMC Project could affect groundwater recharge if more impervious surfaces are created such that substantial infiltration of rain and runoff is prevented.

*Local Groundwater Table Levels.* During construction of the SUMC Project, construction dewatering may be necessary for construction of underground parking and any deep building foundations. This construction dewatering may temporarily affect the local, perched groundwater table. Underground parking structures would extend about four levels below grade (about 41 feet bgs). As noted in the Setting, the design local groundwater table is recommended to be about 30 feet bgs at the Main SUMC Site. Groundwater levels fluctuate depending upon local climate conditions. Water may also pond in excavated pits and trenches during the wet season because of slow permeability soils. In accordance with the Public Works policy adopted in 2008, the Public Works Department does not generally allow groundwater dewatering during the wet season (November through March).

The Public Works Department only allows dewatering of excavations using drawdown well systems. Open pit groundwater dewatering is not allowed and dewatering is only permitted from April through October. The contractor must determine the depth to groundwater immediately prior to excavation by using a piezometer, or by drilling an exploratory hole if the deepest excavation will be within 3 feet of the highest anticipated groundwater level. If groundwater is within 3 feet of the deepest excavation, a drawdown well dewatering system must be used. The Public Works Department may require the extracted groundwater to be tested for contaminants prior to initial discharge and at intervals during dewatering. If testing is required, the contractor must retain an independent testing firm to test the discharge water for the contaminants specified by the Public Works Department, and submit the results to the Public Works Department. The Public Works Department reviews and approves dewatering plans as part of a Street Work Permit. The applicant can include a dewatering plan in the building permit plan set in order to obtain approval of the plan during the building permit review, but the contractor would still be required to obtain a Street Work Permit prior to dewatering and excavation. Construction of the SUMC Project would have to comply with the Public Works Department groundwater dewatering requirements, if dewatering is necessary. Consequently, potential effects of groundwater dewatering would not be substantial and would be temporary and impacts would be less than significant.

98 The ‘design’ local groundwater table depth is the depth to groundwater used for designing building structures based on evidence from geotechnical reports and other sources. Groundwater levels may seasonally, yearly, and spatially fluctuate; groundwater depth is not a constant or necessarily known throughout the entire project site. However, the buildings and structures must be appropriately designed and built for groundwater contact/saturated media conditions if there is a potential for that to occur. The depth at which groundwater is expected to occur is the ‘design’ groundwater table depth.

99 Drawdown wells are installed around the perimeter of the excavation and pump water out of the shallow aquifer to lower the level of the groundwater so the foundation can be constructed without groundwater filling the excavation.

100 Open pit dewatering systems use in-pit sumps to collect groundwater inflow and pit-wall runoff and seepage.
**Groundwater Recharge.** During construction, the balance between pervious and impervious land surfaces\(^{101}\) would repeatedly change. Consequently, there is a potential for a temporary increase in impervious land surfaces and therefore, temporary reduction in groundwater recharge. During much of the construction period, there would be more pervious land surfaces than under existing conditions. At SUMC Project completion, impervious land surface would increase slightly (1 acre, or less than two percent). During a limited time when the new SHC hospital building and FIM1 are complete, and the 1959 Hospital Building complex has not yet been demolished and restored to pervious surfaces, there could be a brief period when impervious land surfaces on the Main SUMC Site would be greater than under existing conditions. However, the SUMC Sites are not in a significant groundwater recharge area.\(^{102}\) A thick, laterally-extensive layer of bay deposits, consisting of undifferentiated clay interbedded with some lenses of coarse-grained alluvium, act as a confining layer separating the shallow (water table) aquifer from the deep aquifer in the SUMC Sites and vicinity.\(^{103}\) This confining layer extends under the SUMC Sites.\(^{104}\) Most of the groundwater recharge in the SUMC Sites vicinity is from flow in San Francisquito Creek or areas to the west of the SUMC Sites. These areas would not be altered during construction of the SUMC Project and they would continue to replenish potential temporary groundwater losses. Therefore, the potential slight change in the amount of impervious land surfaces would not be expected to have a substantial effect on groundwater recharge. Impacts on groundwater recharge during construction would be less than significant.

**Operation.** The SUMC Project could affect local groundwater table levels if permanent groundwater dewatering is implemented for underground structures. Additionally, the SUMC Project could affect groundwater recharge if more impervious land surfaces are created such that substantial infiltration of rain and runoff is prevented. No new groundwater wells would be created as part of the SUMC Project and no groundwater use during SUMC Project operation is anticipated; water supplies are provided by the City of Palo Alto and consist of surface water resources (see Section 3.14, Utilities, for more details).

**Local Groundwater Table Levels.** Underground parking structures would extend to four levels below grade (over 41 feet bgs). As noted in the Existing Conditions section, the design groundwater level for the Main SUMC Site is recommended to be 30 feet bgs. At the Hoover Pavilion Site, groundwater levels are estimated to be between 38 to 53 feet bgs. As mentioned in Section 3.10, Geology, Soils, and Seismicity, foundation drains are not recommended for

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\(^{101}\) ‘Land surface’ refers to the footprint area of structures and landscaping. While green roofs would be considered a pervious surface for runoff reduction, green roofs would not be available for groundwater recharge as would pervious land surfaces.

\(^{102}\) EIP Associates. City of Palo Alto/Stanford Development Agreement and Lease EIR. Figure 3.12-2: Watersheds and Ground Recharge Areas. March 2005.


deep structures. Additionally, the Public Works Department would not allow a perforated pipe drainage system to be installed behind the below-grade parking structure walls or under the slabs. Instead, implementation of underground parking structures and other deep foundations would require flood proofing where they may extend below the groundwater table or design groundwater depth. Therefore, groundwater dewatering during the operation phase would not occur and operation of the SUMC Project would have no direct impact on the local groundwater table.

Groundwater Recharge. As explained above, the SUMC Sites are not in a significant groundwater recharge area and a confining layer separates the surface water table groundwater from the deep groundwater aquifer in the vicinity. The existing SUMC Sites consist of about 27 percent pervious land surfaces available for groundwater recharge and buildout would result in about 26 percent pervious land surfaces available for recharge, or about one percent less pervious land surfaces with implementation of the SUMC Project. Therefore, the SUMC Project overall would not substantially increase the amount of impervious land surfaces that could impede groundwater recharge after construction. It follows then that there would be a less-than-significant impact from operation of the SUMC Project on groundwater recharge.

HW-3. Groundwater Quality. The SUMC Project could have a significant impact on groundwater quality during construction. (S)

During construction, impervious surfaces (e.g., parking lots and buildings) would be removed and pervious surfaces exposed to rainfall and runoff waters. Without controls, infiltrating rainfall could pick up existing pollutants in the underlying soils or pollutants associated with construction activities (e.g., spills and leaks) and carry these materials to the local groundwater table. As mentioned in the Existing Conditions subsection, soils at the SUMC Sites are not highly permeable and there is a confining layer between the upper (perched) water table and the lower groundwater aquifer underlying the SUMC Sites.

Prior to the beginning of construction activities, a stormwater pollution prevention plan (SWPPP) is required per Municipal Code Section 16.09.117 and the Construction General Permit. The SWPPP includes requirements for: describing spill controls and waste management; storing materials and equipment to ensure that spills or leaks do not enter the storm drain system or surface waters; implementation of approved local plans; prohibiting certain construction practices that might cause or contribute to polluted runoff; implementing equipment maintenance schedules and procedures to minimize pollutants from leaks and equipment wear; and other non-stormwater management controls. Dischargers are required to inspect their construction sites before and after storms to identify stormwater discharge associated with construction activity and to identify and implement controls where necessary. These BMPs and other practices are designed to minimize stormwater contact with and transport of potential pollutants to water resources, including groundwater. Additionally, Section 16.09.117 requires a spill response plan for hazardous waste and materials and uncontained construction materials during construction activities; a stormwater pollution prevention plan; and prior approval for any discharge of pumped water. Prevention and clean
up of spills during construction would protect groundwater quality by limiting the potential for infiltrating rainfall and stormwater runoff from picking up spilled pollutants and carrying them to groundwater through the exposed soils. Implementation of these regulatory requirements would generally reduce most construction pollutants’ impacts on groundwater quality to non-substantial levels.

However, in the limited areas on the SUMC Sites where soil contamination has occurred (at 701 and 703 Welch Road and at the Hoover Pavilion site), if contaminated soils remained on the SUMC Sites during construction, exposure of those soils to rainfall runoff or runon and subsequent infiltration could contribute to migration of these pollutants to groundwater. However, as discussed in Section 3.12, Hazardous Materials, the SUMC Project sponsors intend to remove all contaminated soil from these sites prior to SUMC Project construction.

The Hoover Pavilion Site also has a history of groundwater contamination from diesel fuel, but recent testing shows the contamination is below regulatory thresholds and Stanford University has requested a closure agreement from County DEH. (See Section 3.12, Hazardous Materials.) Under the proposed agreement, there would be no requirement to prevent rainfall from infiltrating on the site. Accordingly, impacts on groundwater quality from rainfall runoff or runon would be less than significant.

The presence of polluted soil or groundwater underlying the majority of the Main SUMC Site is not expected, but the potential for contaminated areas from historic uses still exists. The Phase 1 reports summarized in Section 3.12, Hazardous Materials, indicate no evidence of hazardous materials accidents or spills at the Main SUMC Site locations evaluated. However, these Phase 1 reports are limited in scope and do not address the entire Main SUMC Site; therefore, the potential for exposure and transport of historic soil pollutants by infiltrating rainfall or runoff is still a concern for the Main SUMC Site and impacts on groundwater quality could be significant.

**Mitigation Measure.** Mitigation Measure HW-3.1, below, would reduce the SUMC Project’s impact on groundwater quality to a less-than-significant level. (LTS)

**HW-3.1 Develop a Work Plan for any Unknown Contaminated Sites.** During construction, if suspected contaminated soil, undocumented underground tanks, hazardous materials pipelines, or other evidence of potential hazardous materials are discovered, construction activities shall cease and the SUMC Project sponsors shall prepare a workplan to determine the potential risk to human and ecological health. The workplan shall be prepared by a Registered Environmental Assessor and in compliance with the Department of Toxic Substances Control (DTSC) guidelines and the National Oil and Hazardous Substances Contingency Plan (the "National Contingency Plan" [NCP]).

The SUMC Project sponsors, or their representative, shall be responsible for submitting the workplan for the DTSC’s review and approval prior to
implementing field activities. The workplan must include all information necessary for implementing field work. The workplan shall include a Site Safety Plan (SSP) and a Sampling Work Plan (SWP). The SSP must be submitted to the DTSC in conjunction with the submittal of the SWP. The objective of the SSP is to ensure protection of the investigative team as well as the general public during sampling activities.

If risk to human or ecological health is identified, the SUMC Project sponsors shall prepare and implement a Removal Action Workplan (SB 1706 Stats. 1994, Chapter 441) (non-emergency removal action or remedial action at a hazardous substance release site which is projected to cost less than $1,000,000) that is consistent with the NCP.

**HW-4. Stormwater Runoff and Erosion.** The SUMC Project would have a less-than-significant impact on stormwater runoff and erosion. *(LTS)*

**Construction.** The SUMC Project would include construction activities such as excavation and trenching for foundations, underground garages, and utilities; soil compaction and site grading; and demolition of structures and surface parking, all of which would temporarily disturb soils and alter the SUMC Sites drainage patterns. Disturbed soils are susceptible to high rates of erosion from wind and rain, resulting in potential sediment transport from the construction site.

**On-Site Erosion.** Exposure of previously covered soils during building and parking lot demolition, road work and realignment, and utility excavation could lead to increased on-site erosion and off-site sediment transport. Much of the exposed surfaces during construction of the SUMC Project would be below-grade, and therefore, would not be susceptible to off-site sediment transport. Additionally, the RWQCB, City of Palo Alto Municipal Code (Chapter 16.28), Construction General Permit, and City of Palo Alto URMP require erosion and sediment controls for construction projects with more than one acre of land disturbance. These requirements include preparation of a SWPPP, with both construction and permanent erosion and sediment controls.

The SWPPP includes a description of the construction erosion and sediment controls and control of post-construction sediment and erosion control measures and maintenance responsibilities to be implemented. Typical SWPPP construction BMPs include, but are not necessarily limited to: scheduling or limiting activities to certain times of year in order to minimize the potential for disturbed surfaces to be exposed to rainfall erosion during the wet season or wind erosion during the dry season; prohibiting certain construction practices that might contribute to off-site sediment transport; implementing a monitoring program to ensure that sediments do not leave the construction site; implementing other management practices to prevent or reduce pollution, such as using temporary mulching, seeding, or other suitable stabilization measures to protect uncovered soils; installing traps, filters, or other devices at drop inlets to prevent contaminants, including sediment, from entering storm drains; and using
barriers, such as straw bales or plastic, to minimize the amount of uncontrolled runoff that
could enter drains or surface water. Dischargers are required to inspect their construction sites
before and after storms to identify stormwater discharge associated with construction activity
and to identify and implement controls where necessary.

The new Construction General Permit requires certain minimum BMPs be included in the
SWPPP and implemented. Because San Francisquito Creek is listed (303(d)) as impaired by
sediment, the SUMC Project would be automatically a Risk Level of 2 or 3 project, depending
upon the SUMC Sites’ erosion potential. As such, in addition to the minimum specific
required BMPs, construction activities would be subject to NALs or NELs for turbidity and
pH, require effluent monitoring for turbidity and pH, and preparation and implementation of a
Rain Event Action Plan to minimize potential off-site discharges of sediment.

The City’s erosion and sediment control ordinance is contained in Municipal Code Chapter
16.28. All land-disturbing or land-filling activities or soil storage must be undertaken in a
manner designed to minimize surface runoff, erosion, and sedimentation. An interim erosion
and sediment control plan and SWPPP are required and must contain descriptions of surface
runoff and erosion control measures to be implemented.

Additionally, the City of Palo Alto URMP includes performance standards for meeting
requirements of the Municipal NPDES Permit. These include:

- For development of projects with significant erosion potential and planned construction
  activity during the wet season, the City of Palo Alto ensures, through a construction
  inspection program, that erosion and/or sediment control measures are implemented in
  accordance with local ordinances and project conditions of approval and maintained as
  needed during construction.

- The City of Palo Alto inspects construction sites for adequacy of stormwater quality control
  measures at least once per month for active sites, or more frequently based on the size of
  the project, site conditions, precipitation, and the project’s potential impact on stormwater
  quality. All construction sites greater than one acre are inspected at least once before,
  during, and after construction.

- Prior to the beginning of the wet season each year, the City of Palo Alto inspects all sites
  requiring erosion and/or sediment control plans to ensure that measures have been taken to
  minimize erosion and discharges of sediment from disturbed areas.

- The City shall require developers of projects that disturb more than one acre of land area to
demonstrate coverage under the Construction General Permit (C.3.a.iii.).

- The City shall require developers of projects with potential for significant erosion and
  planned construction activities during the wet season (October 1 through April 15) to
  prepare and implement an effective erosion and/or sediment control plan by the start of the
  wet season (C.3.a.iv.).

- Enforcement, training, and outreach provisions.
Standard operating procedures in the URMP include Architectural Review for stormwater controls, and Building Permit review during which Public Works staff impose conditions of approval related to grading and drainage issues (including construction stage and permanent stormwater controls), and a standard maintenance agreement to be signed by the owners of Group 1 projects\textsuperscript{105} to ensure long-term operations and maintenance of permanent stormwater controls.

The SUMC Project would have to comply with these existing regulations and implementation of these requirements would prevent substantial on-site erosion by requiring erosion and sediment controls. Construction site inspection by the City, as required by the UWMP, would ensure that appropriate erosion and sediment control BMPs are implemented and functioning. Therefore, potential changes in drainage patterns and stormwater runoff at the SUMC Sites during construction would have a less-than-significant impact related to on-site erosion.

\textit{Off-Site Erosion.} Off-site erosion and sedimentation could occur if stormwater runoff was conveyed over off-site unstabilized soil surfaces or to a susceptible creek or channel where higher erosive forces associated with increased flow rates could contribute to off-site erosion, including stream bed and bank erosion. All stormwater from the SUMC Site is conveyed through a local or City-owned storm drainage system and discharged into San Francisquito Creek; stormwater runoff would not be expected to flow over unstabilized, off-site soil surfaces. Therefore, there would be no impact related to increased stormwater runoff over off-site unstabilized soil surfaces.

\textit{Operation.} Similar to construction, operation of the SUMC Project could cause or contribute to stormwater runoff and erosion if disturbed surfaces are not stabilized and if changes in drainage patterns result in more runoff that could affect San Francisquito Creek stream bed and bank erosion.

\textit{On-Site Erosion.} The SUMC Project would be required to meet: the City of Palo Alto Municipal Code Chapter 16.11 (Stormwater Pollution) and Chapter 16.28 (Erosion and Sediment Control); the Construction General Permit (SWPPP); and the RWQCB’s revised provision C.3 for storm water regulations that apply to land development projects that create or replace 10,000 square feet of impervious surface. These regulations would require that the SUMC Project incorporate a set of permanent site design measures, source controls, and treatment controls that serve to protect storm water quality, including permanent erosion and sediment transport controls. The SUMC Project sponsors would be required to calculate, develop, and incorporate permanent stormwater pollution prevention measures (preferably

\textsuperscript{105} As defined previously, Group 1 projects include Significant Redevelopment projects. The SUMC Project is a Significant Redevelopment project because it would result in addition or replacement which combined total 43,560 square feet or more of impervious surface on such an already developed site, and as such, is a Group 1 project. Other Group 1 projects include commercial, industrial, or residential developments that create one acre (43,560 square feet) or more of impervious surface, including roof area, sidewalks, and streets, roads, highways, and freeways that are under the Dischargers’ jurisdiction and that create one acre (43,560 square feet) or more of new impervious surface.
landscape-based treatment controls such as bioswales, filter strips, and permeable pavers rather than mechanical measures that require long-term maintenance) to treat a specified percentage of site runoff. The SUMC Project sponsors must designate a party to maintain the control measures for the life of the improvements and must enter into a maintenance agreement with the City. The maintenance agreement must be in the form of a covenant running with the land. The agreement must provide access to the extent allowable by law for representatives or agents of the City for the purposes of verification of proper operation and maintenance of specific C.3 measures. Additionally, in accordance with the City’s erosion and sediment control ordinance (Municipal Code Chapter 16.28), the final erosion and sediment control plan and SWPPP must include a description of permanent control measures to improve the quality of stormwater runoff from the sites. These existing regulatory requirements would serve to minimize the potential for erosion and sediment transport from the SUMC Project by stabilizing disturbed surfaces and by implementing stormwater quality BMPs to prevent sediment transport.

The SUMC Project would also be subject to the Regional Municipal Permit conditions, including implementation of LID practices (Provision C.3.c). LID is a stormwater management strategy that emphasizes conservation and the use of onsite natural features integrated with engineered, small-scale treatment and hydrologic controls to more closely reflect predevelopment conditions, and minimize the need for large sub-regional and regional treatment control measures. Implementation of Provision C.3.c. would further reduce potential erosion and sediment transport. Therefore, the SUMC Project impacts on on-site erosion would be less than significant.

**Off-Site Erosion.** Off-site erosion and sedimentation could occur if stormwater runoff were conveyed over off-site unstabilized soil surfaces or to a susceptible creek or channel where higher erosive forces associated with increased flow rates could contribute to off-site erosion, including stream bed and bank erosion. Surface runoff from the SUMC Site during operation of the SUMC Project would continue to be collected in a local stormwater drain system and the City of Palo Alto stormwater drain system that discharges to San Francisquito Creek. As such, the on-site stormwater drain system would not be substantially altered with implementation of the SUMC Project and the off-site stormwater drain system would not be altered. Therefore, there would be no impact related to increased stormwater runoff over off-site unstabilized soil surfaces.

The SUMC Site surface is currently about 27 percent pervious land surfaces with about 3 percent of green roofs. Implementation of the SUMC Project would replace existing buildings and surface parking lots with new buildings, underground parking, and a new parking structure, and ultimately create about 26 percent pervious land surfaces and about 11 percent of green roofs.\(^{106}\) Green roofs can detain 60 to 100 percent of precipitation, depending upon the

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\(^{106}\) Stanford University Medical Center, Stanford University Medical Center Facilities Renewal and Replacement Project Application, August 2007, as amended; Tab 4, Figure 4-8b.
substrate and size of storm event. The increased amount of pervious surfaces (land surface plus green roof area; a 7 percent total increase in pervious surfaces) would reduce the amount of stormwater runoff from the SUMC Project compared to existing conditions. Because there would be no net-increase in directly-connected impervious surfaces and the SUMC Sites are within an area designated as exempt from HM controls on the County HM map, the SUMC Project would be exempt from the HM stormwater controls requirements; a no-net-increase-in-directly-connected-impervious-area condition is considered to be sufficient to determine that there would be no increase in runoff rates, volume, or flow duration (maintenance of the pre-existing hydrograph) for the small (less than two-year) to medium (10-year) storm events. Because the pre-development hydrograph would be maintained, post-construction conditions under the SUMC Project would not substantially increase off-site bed or bank erosion or sedimentation in San Francisquito Creek.

The Public Works Department requires that the applicant’s engineer provide storm drain flow and detention calculations, including pre-project and post-project conditions. The calculations must be signed and stamped by a registered civil engineer. The applicant may be required by the Public Works Department to provide stormwater detention on-site to lessen the SUMC Project’s impact on City storm drains. Additionally, a Grading and Excavation Permit would be required for the SUMC Project. The SUMC Project plans must include a final grading and drainage plans prepared by a licensed professional. This plan must show the existing and proposed spot elevations or contours of the site and demonstrate the proper conveyance of storm water to the nearest adequate municipal storm drainage system. Existing drainage patterns, including accommodation of runoff from adjacent properties, must be maintained. Downspouts and site drainage features must be shown on this plan. Furthermore, the Public Works Department encourages the developer to keep stormwater on site, as much as feasible, by directing runoff to landscaped and other pervious areas on the site. As such, it can be ensured that post-development runoff does not exceed existing conditions and there would be no impact on off-site bed or bank erosion in San Francisquito Creek.

HW-5. Flooding and Stormwater Conveyance Capacity. The SUMC Project would have a less-than-significant impact on flooding and stormwater conveyance capacity. (LTS)

**Construction.** During construction of the SUMC Project, there may be an increase in the runoff rate for small to medium sized storm events (less than 2-year through 10-year storm event) because of potential for increases in impervious surfaces during the brief period when the new SHC hospital building and FIM 1 are complete and the 1959 Hospital Building complex has not yet been demolished. However, as mentioned in the Existing Conditions section, increased imperviousness often has little effect on flows during extreme events (e.g., greater than the 10-year flood flow events) because, during these events, rainfall saturates even natural soils, rendering them effectively impervious. Additionally, the reach of San

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Francisquito Creek to which the SUMC Project discharges to is not impaired for flood flows and the 100-year flood event is contained entirely within its banks through this section. Furthermore, groundwater dewatering during the wet season (November through March), if necessary, would not be allowed and would therefore not cause or contribute to flooding or stormwater conveyance capacity exceedences. Therefore, construction impacts associated with the SUMC Project on flooding and stormwater conveyance would be less than significant.

Operation. The SUMC Project plans must include a final grading and drainage plan prepared by a licensed professional. This plan must show the existing and proposed spot elevations or contours of the site and demonstrate the proper conveyance of storm water to the nearest adequate municipal storm drainage system. Existing drainage patterns, including accommodation of runoff from adjacent properties, must be maintained. Downspouts and site drainage features must be shown on this plan. Furthermore, the Public Works Department encourages the developer to keep stormwater on site, as much as feasible, by directing runoff to landscaped and other pervious areas on the site. The SUMC Project would not substantially alter site topography or the local storm drain system. Consequently, operation of the SUMC Project would have no impact on flooding and stormwater conveyance capacity.

HW-6. Streambank Instability. The SUMC Project would have a less-than-significant impact on streambank instability. (LTS)

The SUMC Project could affect streambank instability if construction directly disturbs streambanks and/or riparian vegetation, or if construction or operation result in higher flow rates, volume, or duration of flows that could cause or contribute to stream bed or bank erosion. The SUMC Project would not involve any construction activities in or near the bank of the San Francisquito Creek that could directly impact streambank stability. As explained under Impact HW-4, the SUMC Project could, however, increase the amount, rate, or duration of runoff from the SUMC Sites at times during the 12-year construction period, but this condition would be temporary and brief and potential construction impacts would be less than significant. Following buildout, the SUMC Project would reduce the amount of directly-connected impervious area by about 7 percent. As such, operation of the SUMC Project would have no impact on streambank instability during operation.

HW-7. Degradation of Surface Water Quality. The SUMC Project would have a less-than-significant impact on degradation of surface water quality. (LTS)

Construction. The SUMC Project would include construction activities such as excavation and trenching for foundations and utilities, soil compaction, and site grading, all of which would temporarily disturb soils. Disturbed soils are susceptible to high rates of erosion from wind and rain, resulting in potential sediment transport from the construction site. Erosion and sedimentation affects water quality through interference with photosynthesis, oxygen exchange, and the respiration, growth, and reproduction of aquatic species. Additionally, other pollutants, such as nutrients, trace metals, and hydrocarbons, can attach to sediment and be transported downstream, which could contribute to the degradation of surface water quality.
Impact HW-4 addresses the potential effects of the SUMC Project on erosion and sediment transport and existing regulatory requirements that prevent substantial erosion and sediment transport. The potential for the SUMC Project to affect groundwater quality is addressed in Impact HW-3.

The delivery, handling, and storage of construction materials and wastes, as well as the use of construction equipment, could introduce a risk for stormwater contamination that could affect water quality during construction of the SUMC Project. Spills or leaks from heavy equipment and machinery can result in oil and grease contamination, and some hydrocarbon compound pollution associated with oil and grease can be toxic to aquatic organisms at low concentrations. Staging areas or building sites can be the source of pollution because of the use of paints, solvents, cleaning agents, and metals during construction. The effects associated with metals in stormwater include toxicity to aquatic organisms, such as bioaccumulation, and the potential contamination of drinking supplies. Pesticide use (including herbicides, fungicides, and rodenticides), often associated with site preparation work, is another potential source of stormwater contamination. Larger pollutants, such as trash, debris, and organic matter, are additional pollutants that could be associated with construction activities. Effects include health hazards and aquatic ecosystem damage associated with bacteria, viruses, and vectors.

Construction of the SUMC Project would be subject to existing regulations that include the City of Palo Alto Municipal Code (Title 16 – Building Regulations: Chapter 16.09 – Sewer Use Ordinance, Chapter 16.11 – Stormwater Pollution Prevention, and Chapter 16.28 - Excavations, Grading and Fills), the Construction General Permit, and the Municipal Regional Permit (City of Palo Alto URMP).

The Palo Alto Municipal Code, the URMP, and Construction General Permit require a SWPPP. The SWPPP must include specific BMPs that address source control, and specific BMPs that address specific erosion and sediment control. The SWPPP includes a description of: (1) the site; (2) erosion and sediment controls; (3) means of waste disposal; (4) implementation of approved local plans; (5) control of post-construction sediment and erosion control measures and maintenance responsibilities; and (6) non-stormwater management controls. Dischargers are required to inspect their construction sites before and after storms to identify stormwater discharge associated with construction activity and to identify and implement controls where necessary.

The SWPPP is designed to reduce the potential for pollutants in stormwater runoff to reach receiving waters. Typical construction BMPs include, but are not necessarily limited to: scheduling or limiting activities to certain times of year to minimize pollutants and soil exposure to stormwater runoff; prohibiting certain construction practices that could cause or contribute to pollutants in stormwater runoff (e.g., sediment tracking, destabilizing surfaces by disturbance of vegetation); implementing equipment maintenance schedules and procedures to reduce pollutants associated with equipment wear and leaks; implementing a monitoring program to ensure effective prevention of off-site transport and implementation of BMPs;
implementing other management practices to prevent or reduce pollution, such as using temporary mulching, seeding, or other suitable stabilization measures to protect uncovered soils; storing materials and equipment to ensure that spills or leaks do not enter the storm drain system or surface waters; developing and implementing a spill prevention and cleanup plan to quickly clean up pollutants if spills should occur; installing traps, filters, or other devices at drop inlets to prevent contaminants from entering storm drains; and using barriers, such as straw bales or plastic, to minimize the amount of uncontrolled runoff and associated pollutants that could enter storm drains or surface water.

As noted above, the SUMC Project would automatically be classified as a Risk Level 2 or 3 project, depending upon the SUMC Sites’ erosion potential. Certain BMPs that were only required to be considered under the previous permit, but not necessarily implemented in the SWPPP, would now be required as part of the construction SWPPP. These would include BMPs for construction materials and waste management; vehicle storage and management; landscape materials; an assessment and creation of a list of potential pollutant sources; identification of any areas of the site where additional BMPs are necessary; measures to control all non-storm water discharges during construction; erosion and sediment controls; run on and runoff controls and inspection, maintenance, and repairs; a Rain Event Action Plan; and monitoring and reporting requirements.

Additionally, Chapter 16.09 of the Municipal Code requires a spill response plan for hazardous waste and materials and uncontained construction materials at construction sites, for all projects equal to or greater than one acre of disturbed soil, and prior approval for any discharge of pumped water. These existing regulations would serve to reduce the potential for pollutants in stormwater runoff and reduce discharges of pollutants to surface water and groundwater resources.

The URMP ensures that construction inspection occurs in a timely manner and Section 16.11.030 of the Municipal Code ensures that all construction plans are approved by the City Engineer. Additionally, standard operating procedures in the URMP include Architectural Review for stormwater controls, and Building Permit review during which Public Works staff impose conditions of approval related to grading and drainage issues (including construction phase and permanent stormwater controls). Consequently, the potential for pollutant introductions to stormwater and off-site transport to receiving waters during construction activities is minimized.

Degradation of water quality could occur if polluted groundwater from construction dewatering activities is discharged to surface waters or the storm drain system. If construction dewatering is required, the Public Works Department may require the water to be tested for contaminants prior to initial discharge and at intervals during dewatering. If testing is required, the contractor must retain an independent testing firm to test the discharge water for the contaminants specified by the Public Works Department and submit the results to the Public Works Department. The Public Works Department reviews and approves dewatering plans as part of a Permit for Construction in the Public Street (“street work permit”). Furthermore,
any discharge of extracted groundwater would be subject to the Construction General Permit or individual WDR/NPDES permit conditions as determined by the RWQCB. Consequently, potential effects of groundwater dewatering discharges would not be substantial and would be temporary.

These existing regulations, along with the Municipal Regional Permit requirement for Construction Site Controls (including inspection and enforcement by the Permittees), would serve to protect surface water from potential pollutants associated with construction of the SUMC Project. In light of these regulations, potential construction impacts on surface water quality degradation would be less than significant.

**Operation.** The type of stormwater pollutants and their concentrations in runoff water vary with surrounding land uses, topography, and amount of impervious cover, as well as intensity and frequency of irrigation or rainfall. During the operational phase of the SUMC Project, the major source of pollution in stormwater runoff that could cause or contribute to surface water quality degradation would be contaminants that have accumulated on rooftops and other impervious surfaces, such as parking lots and pedestrian walkways. Rainfall washes the accumulated pollutants off surfaces and carries them through the local and City storm drain system to San Francisquito Creek. The type and amount of pollutants in stormwater runoff are therefore affected by both the amount of impervious surfaces and the type of land use that could generate pollutants. Operation of the SUMC Project could cause or contribute to surface water quality degradation if hazardous materials are discharged to the sanitary sewer system without adequate pretreatment.

**Discharge to Sanitary Sewer System.** Pollutants that could cause or contribute to water quality degradation through the sanitary sewer system are effectively controlled by existing regulations. As described previously, Stanford University has, in a written contract, agreed to comply with the Palo Alto Sewer Use Ordinance and the federal (EPA) Pretreatment Standards. Therefore, the same procedures are used for enforcement on the Stanford Campus as are used for industrial facilities in reducing pollutants in sanitary wastewater. Stanford University has a Hazardous Materials Management Plan to prevent environmental risk and exposure to hazardous materials used in health services and operations (see Section 3.12, Hazardous Materials, for more information). These existing regulations and requirements would prevent substantial introduction of hazardous pollutants to the sanitary sewer system. Impacts associated with discharges of hazardous materials to the sanitary sewer system would therefore be less than significant.

**Stormwater Runoff.** Pollutants associated with the operational phase of the SUMC Project would include nutrients, oil and grease, metals, organics, pesticides, and gross pollutants (including bacteria). Nutrients that may be present in post-construction stormwater include nitrogen and phosphorous resulting from fertilizers applied to landscaping, degradation of organic material (e.g., leaves on streets and sidewalks), and atmospheric deposition. Excess nutrients can impact water quality by promoting excessive and/or a rapid growth of aquatic vegetation, which reduces water clarity and results in oxygen depletion. Oil and grease can
enter stormwater from vehicle leaks, traffic, and maintenance activities. Metals can collect on impervious surfaces through atmospheric deposition and machine (e.g., cars) wear, which are then washed off to the storm drain system during storm events. Metals can enter stormwater runoff if there is a direct interaction between bare metal surfaces and stormwater (e.g., bare metal roofs, gutters, downspouts, and other structures, if used). Pesticides can enter stormwater after application on landscaping areas of the SUMC Project and are often toxic to aquatic organisms; some pesticides can bioaccumulate in larger species such as birds and fish. However, several existing regulations and design conditions would limit the SUMC Project’s potential effects on degradation of surface water quality. Additionally, the SUMC Project would not substantially alter the type of land use compared to existing conditions (except for adding green roofs) and therefore, the general type and amount of pollutants that can be expected in stormwater runoff.

The San Francisco Bay and San Francisquito Creek are currently listed as impaired by pesticides, sedimentation/siltation, certain heavy metals, and other constituents. Any additional contributions of these constituents to San Francisquito Creek or the San Francisco Bay could be considered significant. However, TMDLs have been developed for mercury and diazinon and are being developed for the rest of the pollutants by 2018. The SUMC Project would have to comply with any existing TMDLs, which would reduce potential impacts from these pollutants by preventing contributions from surface runoff or sewage disposal above allocated loads that are considered to not contribute to violations of water quality standards. Additionally, other existing regulations would reduce the potential for these pollutants in stormwater runoff from the SUMC Sites. The SUMC Project would be subject to Provision C.3 of the Municipal Regional Permit, the City of Palo Alto URMP, General Construction Permit (SWPPP), and City of Palo Alto Municipal Code, which require incorporation of permanent stormwater quality BMPs and LID requirements, to the maximum extent practicable. Specific minimum BMPs for source control and stormwater treatment are also required, as described under Applicable Plans and Regulations, Municipal Regional Permit. Stormwater quality BMPs would reduce the potential for introduction of pollutants in stormwater runoff, as well as treat stormwater runoff to remove pollutants.

Reducing the amount of impervious surface and providing detention/retention reduces the total amount of pollutants that can be carried to receiving waters in runoff because the total amount of runoff is reduced. As mentioned in the Existing Conditions section, in urban areas such as the City of Palo Alto, the stormwater pollution potential is most highly related to the amount of runoff. Site design measures have been incorporated into the SUMC Project that would reduce the overall amount of impervious surfaces by about 7 percent and increase the amount of green roofs by about 6 acres (9 percent of the SUMC Sites), which would reduce the amount of runoff, and hence, stormwater pollution potential.

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Municipal Code Section 16.09.106 prohibits the discharge of any domestic, industrial, or hazardous waste into storm drains, gutters, creeks, or the San Francisco Bay and requires a spill response plan to clean up materials that may be deposited on surfaces exposed to rainfall and stormwater runoff. These requirements reduce the potential for direct discharge of waste and hazardous materials into the storm drain system and San Francisquito Creek. Furthermore, all refuse areas are required to be in covered areas designed to prevent water run-on to the area and runoff from the area, fuel dispensing area requirements, and loading dock drainage requirements. These practices prevent stormwater runoff contact with areas that are likely to contain pollutants and off-site transport of polluted runoff water. Limiting the amount of pollutants generated, discharged, and susceptible to contact with stormwater runoff reduces the amount of pollutants that can be transported to receiving waters and cause or contribute to water quality degradation.

City of Palo Alto Municipal Code Section 16.11.030 requires permanent stormwater pollution prevention measures that reduce the water quality impacts of stormwater runoff from the entire site for the life of the project. Because the SUMC Project is a Significant Redevelopment project that is expected to replace more than 50 percent of the impervious surfaces of a previously existing development, and the existing development was not subject to stormwater treatment measures, the entire SUMC Project must be included in the treatment measure design, not just the redeveloped areas. Consequently, not only would runoff from the redeveloped areas be treated to reduce the amount of pollutants in stormwater runoff, but runoff from the rest of the SUMC Sites would be treated. This would result in a lower potential for water quality degradation from the SUMC Project compared to existing conditions. Furthermore, stormwater treatment measures proposed as part of a project’s permanent stormwater pollution prevention measures must be designed in accordance with the hydraulic sizing criteria detailed in Municipal Code Section 16.11.030. This ensures that such devices are designed to adequately treat stormwater runoff and to sufficiently remove pollutants from stormwater runoff.

All plans and construction are subject to inspection and approval by the City Engineer, which ensures that selected BMPs are adequate for the expected pollutants in stormwater runoff from the SUMC Sites. Architectural Review and Building Permit review and conditions of approval ensure that the SUMC Project incorporates sufficient stormwater quality BMPs. Furthermore, because no final building or occupancy permit shall be issued without the written certification of the City Engineer that the requirements of Chapter 16.11 have been satisfied, planned BMPs would be effectively implemented.

Long-term operations and maintenance of BMPs is required by the URMP and Municipal Code (Section 16.11.040). As a condition of approval, the City Engineer may require the owner of a development project or significant redevelopment project to establish a self-monitoring and reporting program to ensure all permanent stormwater pollution prevention measures are in compliance with the provisions of Chapter 16.11 (Section 16.11.050). Therefore, the long-term effectiveness of implemented BMPs is ensured.
The SUMC Project would not substantially change the type of land use or surface topography and would not increase the amount of impervious cover. Therefore, the type and concentration of pollutants in stormwater would not be substantially different from existing conditions, without controls. Regardless, existing regulations would still require stormwater quality BMPs to prevent pollutant introduction to stormwater and to treat polluted stormwater from the SUMC Sites. Also, as described in Impact HW-4, post-construction conditions under the SUMC Project would not increase the amount of stormwater runoff because it would increase the amount of pervious land surface area by 7 percent and add 6 more acres (9 percent of the SUMC Sites) of green roofs. Therefore, SUMC Project characteristics and existing regulatory requirements would ensure that impacts of the SUMC Project on stormwater degradation of surface water quality would be less than significant.

**HW-8. Dam Failure Inundation.** The SUMC Project would have a less-than-significant impact regarding dam failure inundation. (LTS)

The SUMC Sites are not in an area subject to risk of a 100-year storm event flood or levee failure; however, it is in a dam inundation area in the event of failure of the Searsville Dam. Existing conditions include the same land uses as proposed and already expose people and property to risk from a dam failure. The SUMC Project would, however, increase the number of people with potential exposure to dam inundation because it would increase the on-site floor area and number of patients, employees, and patient visitors at the SUMC Sites.

The Comprehensive Plan includes an emergency management policy to minimize exposure to all hazards through emergency management planning (Policy N-55). The City of Palo Alto conducts emergency preparedness on an on-going basis and includes specific provisions for pre-emergency planning and post-disaster recovery. The City of Palo Alto has an Emergency Plan to inform and protect citizens against emergencies such as dam failure inundation. Consequently, the risk to the SUMC Project from dam failure inundation would be less than significant.

**HW-9. Violation of Any Water Quality Standards or Waste Discharge Requirements (WDRs).** The SUMC Project would have a less-than-significant impact regarding water quality standards or WDRs. (LTS)

Applicable WDRs include the Municipal Regional Permit, the Construction General Permit, and any individual WDR or NPDES permit associated with construction dewatering (if required). If construction dewatering is minimal, discharges may be covered under the Construction General Permit. If substantial construction dewatering is required, the SUMC Project sponsor would be required to file a Report of Waste Discharge and obtain a WDR permit or waiver of a WDR from the RWQCB, if dewatering water would be disposed of on the land surface. If construction dewatering would discharge directly to San Francisquito Creek or the storm drain system (if permitted by the City of Palo Alto), an NPDES permit application would need to be filed and an NPDES permit would need to be obtained from the RWQCB. Applicable Water Quality Standards are listed in the Basin Plan.
The Municipal Regional Permit and Construction General Permit were prepared to implement requirements for protecting surface water and groundwater quality and to ensure that water quality standards are met. The City has incorporated certain requirements of the Municipal Regional Permit and Construction General Permit into the URMP and Municipal Code and enforces requirements through the permit review and approval processes. Additionally, the City ensures compliance with permit conditions through a construction inspection program, including a final inspection following construction for permanent stormwater quality and quantity (if necessary) controls. Furthermore, the City requires stormwater quality BMPs for the entire SUMC Site, not just the redeveloped areas because the SUMC Project would replace more than 50 percent of the existing impervious surfaces. Additionally, if construction dewatering is required, the City’s Public Works Inspector is required to confirm that the dewatering system is installed per an approved Construction Dewatering Plan for discharge into the storm drain system. The Stormwater Investigator is required to confirm that BMP’s are in place to ensure the quality of the water to be discharged. Consequently, these existing regulations and city requirements ensure that the SUMC Project would have a less than significant impact regarding violation of water quality standards or existing WDRs.

Cumulative Analysis

The context for the analysis of cumulative surface water quality and hydrology impacts is the San Francisquito Creek Watershed for surface water and the Santa Clara Subbasin for groundwater quality and hydrology impacts, including all cumulative growth therein. Those issues for which the SUMC Project would have no impact are not analyzed because the SUMC Project would have no potential to contribute to cumulative impacts. Cumulative development projects in the San Francisquito Creek Watershed and the Santa Clara Subbasin may result in cumulative effects on hydrology and water quality. For cumulative impacts on surface water, growth projections for jurisdictions within the San Francisquito Creek Watershed are applied and a list of reasonably foreseeable future projects within Palo Alto (see Appendix B of this EIR for the list of projects). The HST Project is also factored in. For cumulative impacts on groundwater, growth projections for jurisdictions in the Santa Clara Subbasin are applied and a list of projects in Palo Alto is factored in (Menlo Park is not in the Santa Clara Subbasin). The cumulative effects that could be significant are analyzed below, based on projections of 2025 cumulative growth compared to 2005 and 2010.109

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Cumulative Groundwater Recharge and Local Water Table. The SUMC Project, in combination with reasonably foreseeable probable future development, would have a less-than-significant cumulative considerable impact on groundwater recharge and the local groundwater table. (LTS)

Many of the developable areas within the Santa Clara Subbasin are already nearly built out.\textsuperscript{110}

**Direct Effects.** As mentioned in the Existing Conditions discussion, excessive reliance on groundwater for water supply uses in the past has resulted in lowering of the groundwater table and subsequent land subsidence. The SCVWD now manages groundwater and surface water supplies to protect groundwater resources and to maximize water supply reliability. More than half of the SCVWD water supplies are surface water sources. Use of groundwater in the Santa Clara Subbasin is currently off-set by the SCVWD through artificial recharge in addition to natural recharge. Therefore, future growth and potential direct cumulative impacts on groundwater levels would be less than significant.

**Recharge Potential.** As discussed under Existing Conditions, natural recharge occurs principally as infiltration from streambeds and direct percolation of precipitation that falls on the basin floor in areas with high recharge potential. Consequently, changes in overlying land surface hydrology could alter groundwater recharge rates by increasing the amount of impervious surface cover or by increasing stormwater runoff so that rainfall does not percolate to groundwater. Natural groundwater recharge from direct precipitation can occur in the unconfined groundwater subbasin region.\textsuperscript{111} None of the listed near-term projects within the City of Palo Alto, or the HST project, are located over the unconfined Santa Clara Subbasin; no foreseeable planned development is located within a high groundwater recharge area. Comparison of the unconfined aquifer regions with HMP buildout map\textsuperscript{112} indicates that the potential recharge areas of the Santa Clara Subbasin are already primarily 90 percent built out. However, some areas within the potential groundwater recharge regions are still not built out and future development could increase impervious surfaces within the area with a subsequent loss in groundwater recharge potential.

The SCVWD Capital Improvement Plan includes projects for increasing groundwater recharge potential, water conservation, and water reuse to ensure adequate water supplies without diminishing resources.\textsuperscript{113}


Management of groundwater resources by the SCVWD would continue to serve to protect groundwater resources, incorporate artificial recharge to offset groundwater losses, and maximize water supply reliability within the subbasin. Additionally, the Municipal Regional Permit requires HM stormwater controls, such as infiltration or detention, for areas where increased runoff from creation of more impervious surfaces would potentially degrade stream channels. Furthermore, future development would undergo the environmental review process that would determine if potential effects on groundwater recharge would be substantial and identify mitigation measures to minimize impacts, where necessary. Therefore, it is unlikely that there would be a cumulative substantial modification in the amount of runoff and hence, a decrease in groundwater recharge potential. Consequently, potential cumulative impacts on groundwater recharge would be less than significant.

HW-11. Cumulative Groundwater Quality Impacts. The SUMC Project, in combination with reasonably foreseeable probable future development, would have a less-than-significant cumulative impact on groundwater quality. (LTS)

Groundwater quality within the Santa Clara Basin is considered to be very good (see the Existing Setting of this section). Therefore, although this is an important water resource, it is not already degraded or in imminent risk of substantial degradation.

Most of the Santa Clara Subbasin is a confined aquifer, which would limit the potential for infiltrating pollutants to reach the underlying groundwater supply aquifer. Undeveloped areas of the Santa Clara Subbasin would not be expected to have contaminated soils or groundwater that could cause or contribute to degradation of groundwater quality during construction of future development. Redevelopment of existing developed areas over the confined aquifer could expose contaminated soils to rainfall runoff and infiltration; however, potential migration of pollutants to groundwater would be impeded by the confining layers. Redevelopment in potential groundwater recharge areas may expose contaminated soils and groundwater to precipitation and runoff that could contribute to migration of pollutants into the shallow groundwater, as described for the SUMC Project. Only one listed future project, 3401 Hillview, is potentially located above the unconfined aquifer zone and all significant redevelopment would be subject to the environmental review process to identify project-specific risks and mitigation, if necessary, to groundwater quality and contaminated groundwater migration. Additionally, the existing Santa Clara Valley Urban Runoff Pollution Prevention Program, Municipal Regional Permit, local codes and regulations, limitations on infiltration BMPs where groundwater would be susceptible to contamination, and implementation of construction BMPs (SWPPP) would reduce the potential for spill and hazardous material contamination of groundwater resources and mitigation of contaminated soils during construction activities. Consequently, future development in the Santa Clara Subbasin would be protected from contamination, would not expose contaminated soils or groundwater to

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infiltrating or runoff waters and would therefore not substantially degrade groundwater quality. As such, cumulative impacts on groundwater quality would be less than significant.

**HW-12. Cumulative Stormwater Runoff and Erosion.** The SUMC Project, in combination with reasonably foreseeable probable future development, would have a less-than-significant cumulative impact on stormwater runoff and erosion. (LTS)

Population growth within the San Francisquito Creek Watershed is expected to increase by about 8.5 to 12.6 percent. The largest changes are expected to occur within the City of Palo Alto, although 2 to 3 percent of population growth would occur in the less developed Woodside and Portola Valley. Population, household, and job growth would likely result in a combination of infill, redevelopment, and new development within the watershed; however, many of the developable areas within the watershed are already nearly built out.\(^{115}\)

All of the near-term projects in cities of Menlo Park and Palo Alto are located within areas requiring HM controls or in areas where hydrograph modification would not contribute to stream bed or bank erosion (HM control exempt areas).\(^{116}\) Reasonably foreseeable probable future planned development would primarily result in replacement of existing land uses with similar land uses. However, some vacant parcels are planned for development of residential, recreation, institutional, and retail land uses. The majority of foreseeable development within the City of Palo Alto and along El Camino Real in Menlo Park would occur in areas that are already 90 percent built out.\(^{117}\) Additionally, the HST project is located in an HM control exempt areas because it is in catchments draining to hardened channels and/or tidal areas or catchments and subwatersheds greater than or equal to 65 percent impervious surfaces, and as such, development within these areas would have little effect on off-site channel erosion.\(^{118}\)

Stormwater runoff and erosion within the San Francisquito Creek watershed are subject to existing regulatory requirements (Municipal Regional Permit, Construction General Permit, as well as local municipal codes), which include both construction phase and permanent erosion and sediment controls that prevent substantial erosion and sediment transport from development within the San Francisquito Creek watershed. Additionally, all of the jurisdictions in the San Francisquito watershed regulate activities that can cause erosion and sedimentation through their municipal codes. The stormwater ordinances adopted by all of the stakeholders ensure

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legal authority to control erosion and sediment transport. Furthermore, new development and redevelopment within the watershed would be subject HM controls in accordance with the Municipal Regional Permit. These existing regulations require stormwater controls where post-development site runoff may contribute to increased stream bed or bank erosion by increasing the amount of impervious surfaces or otherwise increasing the rate, volume, or duration of stormwater runoff to an erosion-susceptible creek or channel. Additionally, most cumulative development would not likely occur over such a long time frame that substantial interim changes in impervious surfaces would be present. Consequently, potential cumulative stormwater runoff and erosion impacts would be less than significant.

**HW-13. Cumulative Flooding and Stormwater Conveyance.** The SUMC Project, in combination with reasonably foreseeable probable future development, would have a less-than-significant cumulative impact on stormwater runoff and erosion. (LTS)

Continued growth and development within the San Francisquito Creek Watershed could increase the amount of impervious areas. However, as discussed earlier, most of the foreseeable projects within the cities of Menlo Park and the City of Palo Alto are primarily infill and re-development and would not substantially alter the amount of impervious surfaces within the watershed. As discussed under Impact HW-12, if the amount of impervious surfaces is increased, stormwater runoff controls would be required to ensure that runoff does not exceed existing rates for less than two-year through 10-year storm event for areas subject to HM controls. Other areas are already mostly impervious surfaces and redevelopment would not substantially alter the amount of impervious surface cover and hence, stormwater runoff. Furthermore, as discussed under Impact HW-5, increased imperviousness in urban areas often has little effect on flows during extreme events (e.g., 100-year flood flow events) because during these events, rainfall saturates even natural soils, rendering them effectively impervious. Therefore, potential effects of cumulative development and growth in the San Francisquito Creek on flooding and stormwater conveyance would be less than significant.

**HW-14. Streambank Instability.** The SUMC Project, in combination with reasonably foreseeable probable future development, would have a less-than-significant cumulative impact on streambank instability. (LTS)

As discussed under Impact HW-12, new development and redevelopment within the watershed would be subject to either the San Mateo or Santa Clara Permittees’ Hydromodification Management Requirements in accordance with the Municipal Regional Permit. These Permittees require stormwater HM controls where post-development site runoff may contribute to increased stream bed or bank erosion (streambank instability). The San Mateo or Santa Clara Permittees’ HM control requirements are very similar regarding erosion, flow, and

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sediment BMPs for significant new and redevelopment. As mentioned above, all foreseeable development in the City of Menlo Park and the City of Palo Alto, including the HST project, would occur within areas subject to HM controls or be located in watersheds that are exempt from requiring HM controls, and therefore, are not subject to stream bed or bank erosion from development or redevelopment.

Additionally, the San Francisquito Creek Watershed Council coordinates stewardship of the San Francisquito Creek and its surrounding land to restore habitat, monitor water quality and observe creek trends, raise awareness about the watershed, and provide policy support for local governments to keep the creek healthy and safe. Representatives from public agencies, local governments, community organizations, and individual citizens make up the Steering Committee. This oversight of San Francisquito Creek and coordination with stakeholders and policy makers further serve to protect and/or restore San Francisquito Creek from potential hydrograph modification impacts, as well as other impacts to its form and/or function.

In order to address community concerns regarding flooding and environmental preservation on San Francisquito Creek, the City has worked with neighboring jurisdictions to create the San Francisquito Creek Joint Powers Authority (JPA), an agency empowered to protect and maintain the 14-mile San Francisquito Creek and its 45 square-mile watershed. The JPA was created through the adoption of a joint powers agreement by the member agencies in order to:

- To facilitate and perform bank stabilization, channel clearing, and other creek maintenance;
- To plan flood control measures for the San Francisquito Creek watershed;
- To take actions necessary to preserve and enhance environmental values and instream uses of San Francisquito Creek; and
- To coordinate emergency mitigation and response activities relating to San Francisquito Creek.

Nearly all of the jurisdictions within the San Francisquito Creek Watershed have strong policies calling for the protection of natural resources, including trees, riparian corridors, and watercourses. The general plans of Portola Valley and Woodside list preservation of the natural beauty and landforms as primary goals. Both towns’ design guidelines also stress the protection of drainage swales, streams, slopes, trees and plant communities. Woodside, Palo Alto, Menlo Park, and Santa Clara County have adopted general plan policies to protect riparian corridors by creating buffers and the City of Woodside has implemented that policy in its zoning ordinance. Portola Valley has created a Creekside Corridor Committee to study recommendations for establishing regulations and policies along creeks. Menlo Park also is planning to revise its Grading and Drainage Site and Design Guidelines or standard Conditions of Approval to promote the benefits of buffer zones and creek setbacks and restrict or prohibit structures and impervious surface within a specified distance from the top of the creek bank.

In Santa Clara County, the SCVWD has authority to regulate certain activities near streams. On October 24, 2006, the SCVWD adopted a new Water Resources Protection Ordinance that
governs and requires permits for activities that encroach on District land or facilities. The County and local municipalities continue to exercise their own land use authority and incorporate review of streamside activities into their existing land development approval and permitting processes.

Consequently, compliance with existing regulations and requirements would protect streambank stability and cumulative streambank instability impacts would be less than significant.

**HW-15. Degradation of Surface Water Quality.** The SUMC Project, in combination with reasonably foreseeable probable future development, would have a less-than-significant cumulative impact on degradation of surface water quality. (LTS)

Please see the discussion for Impact HW-7. Future development within the watershed would include construction activities such as excavation and trenching for foundations and utilities, soil compaction and site grading, all of which would temporarily disturb soils. Disturbed soils and any associated pollutants are susceptible to high rates of erosion from wind and rain, resulting in potential sediment transport from the construction site. Additionally, the delivery, handling, and storage of construction materials and wastes, as well as the use of construction equipment, could also introduce a risk for stormwater contamination that could impact water quality. Following construction, the major source of pollution in stormwater runoff would be contaminants that have accumulated on rooftops and other impervious surfaces, such as parking lots and pedestrian walkways.

Construction activities and development within the watershed would be subject to existing regulations that include the SFB Basin Plan, Construction General Permit, the Municipal NPDES Permits (San Mateo County Water Pollution Prevention Program and Santa Clara Valley Urban Runoff Pollution Prevention Program), Municipal Regional Permit, and existing municipal codes. These existing regulations would serve to protect surface water from potential pollutants associated with construction and potential cumulative construction impacts on surface water quality would be less than significant.

The San Francisco Bay and San Francisquito Creek are listed as impaired by pesticides, sedimentation/siltation, certain heavy metals, and other constituents. Therefore, any additional contributions of these constituents to San Francisquito Creek or the San Francisco Bay could be deemed potentially significant. However, TMDLs have been developed for mercury and diazinon and are being developed for the rest of the pollutants by 2018. All projects within the watershed that discharge to the San Francisco Bay would have to comply with any existing TMDLs, which would reduce potential impacts from these pollutants. Furthermore, the impaired waters list is revisited every two years and updated as necessary. Continued monitoring and assessment serves to identify new impairments and evaluate the effectiveness of programs for protecting water quality.

Additionally, new or redevelopment projects within the San Francisquito Creek watershed would have to undergo the environmental review process and local permit application process
and have to comply with the San Mateo County Water Pollution Prevention Program or the Santa Clara Valley Urban Runoff Pollution Prevention Program for post-construction water quality management. The Municipal Regional Permit would also require pollutant source control and project design requirements (i.e., LID) that would further reduce the potential for pollutants in stormwater runoff and degradation of surface water quality. Therefore, existing regulations and requirements would protect surface water quality and cumulative water quality degradation impacts would be less than significant.

**HW-16. Dam Failure Inundation.** The SUMC Project, in combination with reasonably foreseeable probable future development, would have a less-than-significant cumulative impact regarding dam failure inundation. (LTS)

The Association of Bay Area Governments (ABAG) Dam Failure Inundation map shows the areas subject to dam failure inundation within the San Francisquito Creek Watershed. Most of the areas subject to dam failure inundation are already developed areas, except for areas adjacent to stream and tributary corridors. Development of areas adjacent to stream and tributary corridors would be subject to regulations and requirements associated with streambank instability protection and riparian habitat protection. Additional development or re-development within already developed areas subject to dam failure inundation would not substantially increase impacts associated with dam failure inundation; existing risks and exposure to dam failure inundation would not be greatly increased.

The federal Disaster Mitigation Act of 2000 (DMA 2000) requires that cities, counties, and special districts have a Local Hazard Mitigation Plan to be eligible to receive FEMA hazard mitigation funds. To assist local governments in meeting this requirement, ABAG received a grant from FEMA through the California Governor’s Office of Emergency Services to prepare a multi-jurisdictional plan that fulfills the requirements of DMA 2000. The Plan and ABAG Annex were adopted by ABAG’s Executive Board on March 17, 2005. As a participant in the ABAG multi-jurisdictional planning process, staff from the cities of Menlo Park and Palo Alto helped in the development and review of the comprehensive list of mitigation strategies in the overall multi-jurisdictional plan. The Emergency Operations Coordinator, within the City of Menlo Park Police Department, ensures that monitoring of the Menlo Park Annex occurs. The City of Palo Alto’s Manager’s Office ensures that monitoring of the Palo Alto Annex occurs. Additionally, ABAG ensures that the overall multi-jurisdictional plan is monitored and updated on an on-going basis.

No City of Menlo Park critical facilities are located within a dam failure inundation area. Furthermore, the Palo Alto Comprehensive Plan includes an emergency management policy to minimize exposure to all hazards through emergency management planning (Policy N-55). The City of Palo Alto conducts emergency preparedness on an on-going basis and includes specific provisions for pre-emergency planning and post-disaster recovery. The City of Palo Alto has

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an Emergency Plan to inform and protect citizens against emergencies such as dam failure inundation. Consequently, these existing mechanisms would ensure that cumulative impacts associated with dam failure inundation would remain less than significant.

**HW-17. Violation of Any Water Quality Standards or Waste Discharge Requirements (WDRs).** The SUMC Project, in combination with reasonably foreseeable probable future development, would have a less-than-significant cumulative impact on violation of water quality standards and WDRs. (LTS)

Please see the discussion for Impact HW-9. Applicable WDRs include the Municipal Regional Permit, the Construction General Permit, the Industrial General Permit (where applicable), and any individual WDR or NPDES permit associated with construction dewatering (if required). If construction dewatering is minimal, discharges may be covered under the Construction General Permit. Applicable Water Quality Standards are listed in the Basin Plan and incorporated TMDLs. The Municipal Regional Permit and Construction General Permit were prepared to implement requirements for protecting surface water and groundwater quality and to ensure that water quality standards are met. Municipalities within San Mateo and Santa Clara Counties have incorporated requirements of the Municipal Regional Permit and Construction General Permit into their Municipal Codes and enforce these requirements through permit review and approval processes. Furthermore, the Municipal Regional Permit requires HM controls for projects within San Mateo and Santa Clara counties that may cause or contribute to increased bed or bank erosion. Additionally, development within the San Francisquito Creek Watershed and Santa Clara Subbasin would have to undergo the environmental review process that would identify potential project-specific impacts and mitigation such that overall development would not cause or contribute to substantial violations of water quality standards or waste discharge requirements and cumulative impacts would be less than significant.
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